ILLINOIS MEDICAL JOURNAL

THE OFFICIAL ORGAN OF

THE ILLINOIS STATE MEDICAL SOCIETY

VOL. LX | OAK PARK, ILL., SEPTEMBER, 1931 | No. 3

ILLINOIS MEDICAL JOURNAL

Published monthly by the Illinois State Medical Society under the direction of the Publication Committee of the Council.

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Society proceedings and news items and changes in the mailing list to Dr. Henry G. Ohls, Managing Editor, 1618 Juneway Terrace, Chicago.

Contributors will submit all copy for publication typewritten on standard size paper and double spaced. Copy not complying with this rule will be returned, if convenient.

Subscription price of this JOURNAL to persons not members of the Illinois State Medical Society is $3.00 per year, in advance, postage prepaid, for the United States, Cuba, Porto Rico, Philippine Islands, Hawaiian Islands and Mexico. $3.50 per year for all foreign countries included in the postal union. Canada, $3.25. Single current copies, 50 cents.

Editorials

EARLY DIAGNOSIS AND PROMPT TREATMENT OF POLIOMYELITIS THE NEED OF THE HOUR

Poliomyelitis is steadily on the increase. Up to the present time in 1931 approximately 1200 cases have appeared throughout the country. Its prevalance and seriousness demands immediate recognition and drastic treatment.

Poliomyelitis,—acute, infectious, systemic and with or without paralysis, is prevalent and perilous.

Early treatment is the only edge that the medical profession has upon this truly frightful disease. Speedy suspicion, definite diagnosis and immediate isolation are the three vital indications against the spread of this malignant pest. Eternal vigilance is as much the watchword against poliomyelitis as it is against national defense. For poliomyelitis is a scourge that minimizes the safety-line of adult age, literally striking relentlessly. from the cradle to the grave.

Nor does it seem to be affected by geography or economics.

Although called oftenest to the laity under the name of "infantile paralysis" there are as many if not more cases of poliomyelitis that never reach the paralytic stage as there are those that do.

While the calendar year is never entirely free from cases of poliomyelitis annually the late summer and early autumn seem to bring simultaneous epidemics in almost every section of this country. So far as is known the infection is primarily that of the respiratory system. It is as much a disease of wealth as it is of poverty.

Many doctors fail to recognize poliomyelitis in its early stages and thereby defeat subsequent successful cure. This is because they refuse to consider the probability of poliomyelitis if paralysis is absent. As a matter of fact, vast numbers of cases of enterior poliomyelitis never reach the paralytic stage.

This acute, general infection involves the cen-

tral nervous system, and oftenest attacks young children.

Poliomyelitis appears to prefer summer to winter for its attacks. In the disastrous late summer epidemic of 1916, New York City alone saw over 9,000 cases and 2,448 deaths.

But death is not the greatest horror accompanying infantile paralysis. The evil poliomyelitis wreaks is not interred with the bones of victims, but lives on and in and with them. Semi-invalidism and lifelong deformity are the consequences of unfortunately treated because tardily recognized poliomyelitis.

In fact the entire attack upon poliomyelitis resolves itself into these three main factors:

1. Early recognition.
2. Isolation of patient.
3. Rest and symptomatic treatment.

Paralysis may ensue within a few hours of the onset of the attack and as the success of serum treatment depends upon its administration prior to the appearance of paralysis, the one point to be drummed home with everyone is the need for early recognition. Any evidence of muscle injury should receive especial attention. Deformity occurs quickly and spreads rapidly.

Frequently there are two stages in the preliminary systems of the disease.

Headache and drowsiness present generally the first symptoms. Usually there are other symptoms associated ordinarily with simple gastro-intestinal upsets, such as nausea, vomiting, slight fever and frequently constipation, or occasionally diarrhea. This condition will last for a day—perhaps two. The patient feels better and passes off the attack as just one of those things to which human life is naturally heir and for which home medication is competent and sufficient. But in from three days to a week another story is told. There is a re-appearance of symptoms this time accompanied by slight stiffness of the neck or of spinal muscles and by muscle pain that makes the child resent being moved or disturbed. *This is the stage when the disease is invading the central nervous system and the time when if successful treatment is to be effected it must be applied. And even at this time, so vague, so insidious are the approaches of the scourge that clinical picture and clinical history alone where the unversed are concerned may not yield accurate diagnosis and in case of doubt or for confirmation have recourse to spinal punctures.*

This lumbar puncture however should be attempted only by one skilled in its technic and then only after due consideration.

Rest must go hand in hand with the *Serum Treatment.*

The U. S. Public Health Service has classified poliomyelitis as 1. Cases with characteristic paralysis;

2. Cases without paralysis but exhibiting symptoms indicative of meningeal irritation and usually of minor disturbance of motor centers that are the so-called abortive cases;

3. Cases that have symptoms similar to the initial symptoms of known cases of infantile paralysis but without definite involvement of the central nervous system—are very common cases indeed.

The specific infection is as prevalent as measles. But it has been considered capable of the establishment of immunity without manifestation of recognizable symptoms.

Let it be emphasized that onset of infantile paralysis is characterized almost invariably by a rise of temperature, and the next common symptom is gastro-intestinal disturbances. There is general malaise, headache, restlessness and irritability followed by drowsiness with a disinclination to move the body or to be moved. There is a stiffness of the neck and spine, indicated by the position the patient takes in bed and by complaint of pain when the spine is flexed. The tendon reflexes are usually abnormal and there may be marked tremor or ataxia with musclar weakness. The paralysis that occurs usually in two or three days from the onset of illness is a flaccid motor paralysis not accompanied by loss of sensation. The legs are more frequently affected than the arms; occasionally the muscles of the palate are affected, or the visional muscles or the external rectus muscles of the eye. In fatal cases, death is due to paralysis of the muscles of respiration usually preceded by progressive paralysis of the extremities.

Well has it been said that efforts must be directed toward limiting the extent of injury by placing the patient at rest as completely as possible. Massage of the paralyzed muscles is harmful. *Rest is the most important thing of all in the acute stage of the disease.* When the

convalescent stage begins, usually in about six weeks, gentle massage and passive movement may be used, but they are capable of doing harm as well as good. A trained orthopedic surgeon at this stage should be consulted to lay out a plan of treatment. *Manipulations practiced by chiropractors and other cults should be avoided absolutely.* There is every reason to believe that rough handling of the spine will render impossible the recovery of some affected tissue which otherwise would take place. Not only are the patients injured by the manipulations of cults, but those things are omitted which may be expected to prevent the occurrence of deformity.

Diagnosis may usually be established by lumbar puncture, but this should be attempted only by one skilled in its technic and then only after consideration as to whether the benefit will justify the procedure.

THE STATE BOARD OF HEALTH HAS AVAILABLE A SUPPLY OF CONVALESCENT POLIOMYELITIS SERUM

With poliomyelitis spreading insidiously throughout the country it is fortunate for residents of Illinois that the Illinois State Department of Public Health has available an adequate supply of convalescent poliomyelitis human serum as well as of sodium citrate.

Instructions for the use of the serum accompany each vial of serum and each package of sodium citrate. There is no charge made for either. In addition where such service is practicable a physician from the State Department of Public Health, especially qualified in this field, will, if requested, be detailed both to consult with the local physician and to assist in the administration of the serum.

Since 1910 when Netter advocated the use of convalescent poliomyelitis serum the burden of supply has been allowed to fall largely upon research institutions rather than upon its legitimate bearers—the public health departments. Collection of convalescent poliomyelitis serum entails time, effort and expense. Yet it is the indicated palliation and nearest remedy for the scourge that has been proven to be the most important cause of disability among the 16,000 physically handicapped children in Illinois. Evidence indicates that this convalescent serum if used in time will prevent the paralysis of poliomyelitis.

HENCE PHYSICIANS MUST NOT NEGLECT ITS USE WHEN AVAILABLE UNDER ANY CIRCUMSTANCES.

The use of sodium citrate is indicated when physicians wish to use whole blood therapy for intramuscular administration. The sodium citrate prevents coagulation prior to use of blood drawn from donors. This whole blood therapy is of value in poliomyelitis cases, and also of unquestionable benefit in aborting measles as well as in their prevention. Let it be repeated however that too much emphasis cannot be placed upon the need for the prophylactic use of convalescent serum for susceptible contacts. These serums are of practical therapeutic importance even in the absence of controls.

EVERY ONE SHOULD BE ALERT AT EVERY MOMENT TO THE POSSIBILITY OF INFANTILE PARALYSIS

Family physicians and public health department employees everywhere should be at attention every moment, alert to the most infinitesimal suggestion of infantile paralysis.

Parents generally and supervising corps in charge of juvenile institutions should be sent simple yet specific warning as to the virulency, insidiousness and ubiquity of this common and mutilating disease. Since early diagnosis is the best weapon with which poliomyelitis can be met with and fought outright, and possibly conquered, here again is eternal vigilance the price of even comparative safety.

Thanks to general precautions the nearest approach to an epidemic so far this season has been in New York City. On July 25 there were recorded 195 definitely known cases. This did not include the remarkably large number of cases of poliomyelitis in one of its many stages that are difficult, ay, even impossible for the inexpert or rather unfamiliarized physician to recognize. By August 4, 1931, this number of cases in New York City had increased to 800. City health stations immediately opened stations to take blood from convalescents from the disease, since convalescent blood serum is the one tested remedy, and a fairly sure one, if used early enough.

The disease has been slowly increasing. The first week in August, 1931, Chicago reported

six cases; Washington, seven; Detroit, five; Boston, seven; New Haven, eighteen, and New Orleans, Buffalo, Los Angeles, and St. Paul, a case apiece.

No age is immune from infantile paralysis. What seems to be a trivial malaise may be the dread scourge itself. Restlessness, drowsiness, fever, irritability, nausea, constitpation or diarrhea, pains in the back, neck, arms and legs, stiff neck and spine call for immediate isolation, rest in bed and a physician. Serum will check the disease. Even in cases of paralysis—that does not always ensue—death may not result, but what is almost inevitable is mutilation or invalidism of the body requiring much time and effort for attempted re-education, that is rarely successful.

NINE PRE-PARALYSIS SYMPTOMS OR DIAGNOSTIC POINTS IN POLIOMYELITIS

A special advisory committee appointed by the president of the Medical Society of the State of New York,—Dr. W. D. Johnson of Batavia—has been more than busy with the current epidemic in that section.

Realizing the importance of speedy recognition, and of accurate diagnosis prior to the appearance of characteristic paralysis this committee compiled a list of nine especial symptoms (N. Y. State J. M., Aug. 5, 1931) to be sought for in the pre-paralytic stage. Suggestion was made that the nine symptoms or diagnostic points be copied and carried about on the prescription pads of physicians who have had experience with comparatively few cases of poliomyelitis and hence might overlook any one of the salient symptoms of poliomyelitis.

As set down these symptoms run:

1. FEVER — Never high. Average of 102° F.

2. HEADACHE—Severe. Frequently general. May be nuchal. If absent replaced by severe back pain.

3. RIGIDITY OF NECK—Distinct resistance to anterior flexion. Rarely is there retraction and never lateral limitation.

4. TREMOR—Fine trembling of lips and hands, especially on movement, as when taking a glass of water. There may also be coarse twitching in the sleep.

5. APATHY — Patients are mildly indifferent and drowsy—never comatose. Perfectly bright and alert whan aroused but then sometimes irritable.

6. VOMITING—Once or twice on the first day. Rarely persistent or severe, YET *vomiting is often severe as an initial symptom in the bulbar types.*

7. RETENTION OF URINE—When questioned the mother or patient often remarks a twelve to twenty-four period without urination. It never demands catherization.

8. CONSTIPATION — Almost uniformly present.

9. SWEATING—Rarely profuse. Seen usually as beading about lips and neck.

OUTSTANDING TRIAD — Headache, tremor, stiff neck. Entire pre-paralytic picture presents clinical entity with symptoms definitely those of a mild meningitis.

Prevention is the one safe, sure cure for poliomyelitis but when prevention fails and the fearful malady presents itself in a community the next best thing, in fact the one alternative is immediate recognition and drastic action.

AN ANALYSIS OF PHYSICIANS' INCOME AND EXPENSES

Domestic Commerce gives the following data relative to Physicians' income and expenditures:

"Annual expenditures of doctors for professional purposes range on the average from $7,091 for radiologists to $3,239 for general practitioners, according to a survey by *Medical Economics,* reported in Trends and Indications. Annual purchases of surgical instruments and supplies range from $1,115 to $264 for the different kinds of doctors, while similar expenditures for medicines and pharmaceuticals range from an average of $1,064 to $201 each year.

"General practitioners had an average net income of $4,188, the lowest of the group, while surgeons with an average net income of $9,233 annually were highest. The ratio of general practitioners to specialists for all groups was reported to be 204 to 1."

UNDER GROUP PRACTICE THE COST OF MEDICAL CARE IS LIKELY TO BE INCREASED

Dr. Ray Lyman Wilbur, chairman of the committee on the "Cost of Medical Care" in the *Public Ledger,* Philadelphia, under date of March 22, 1931, makes the following statement relative to "Group Clinics" as an aid to the solution of the so-called increasing cost of medical care. We quote:

"The present use of the term 'clinic' is quite different from its original definition of 'a medical lecture at the bedside or in the presence of patient.' The present conception of a group clinic is an association of specialists for the purpose of group diagnosis. Medical care, or the treatment of patients, is a minor function of these groups. If medical care is to be handled by a group of physicians, the cost to the patient is likely to be greater than under the care of the family physician or general practitioner. Co-operative service may offer a partial solution but there is always a danger of disturbing that intimate relationship between physician and patient which has been one of the distinct attractions of medical practice.

"The increasing cost of medical care is due to a number of factors in which the physician's fee is often given undue prominence. All medical education at the present time is directed toward a more comprehensive training of the general practitioner. A particular need is the education of the public for a better appreciation of the services of the family physician and that only in exceptional cases is a specialist required. Group practice is still to be regarded as an experiment. Whether it will solve the problem of more economic medical service remains to be determined."

ANNUAL MEETING OF WOMAN'S AUXILIARY TO THE ILLINOIS STATE MEDICAL SOCIETY

The Fifth Annual Meeting of the Woman's Auxiliary to the Illinois State Medical Society held in East St. Louis May 5, 6 and 7, 1931, was attended by representatives from thirty-three counties. There were 16 delegates present from County Auxiliaries and presidents of nine organized counties were in attendance and gave reports.

An open meeting for all members and guests was held at 9 o'clock Wednesday morning at which time reports of officers and committee chairmen were given and the business and policies of the organization were discussed. The revised constitution was presented by the revisions committee, and with a few minor changes was adopted. The report of the nominating committee was received and the following officers and councilors were elected: President, Mrs. T. O. Freeman; President Elect, Mrs. E. W. Mueller; First Vice, Mrs. W. D. Chapman; Second Vice, Mrs. Solomon Jones; Third Vice, Mrs. A. H. Baugher; Corresponding Secretary, Mrs. S. E. Allen; Recording Secretary, Mrs. M. O. Wilkins; Treasurer, Mrs. A. H. Brumbach; Councilors: First District, Mrs. D. J. Evans; Second District, Mrs. A. D. Middleton; Third District, Mrs. E. R. Steen, Mrs. S. M. Goldberger, Mrs. H. M. Peterson; Fourth District, Mrs. C. H. Anderson; Fifth District, Mrs. H. B. Henkel; Seventh District, Mrs. C. M. Jack; Eighth District, Mrs. H. I. Conn; Tenth District, Mrs. C. O. Boynton.

The Ladies' Entertainment Committee had planned a program of varied interests for the visiting ladies and the wonderful success of the meeting was due to their untiring efforts.

At 1 o'clock on Wednesday the St. Clair County physicians wives entertained the visiting ladies at luncheon at the St. Clair Country Club. This was a most enjoyable affair. Mrs. McGlothlan, president of the Woman's Auxiliary to the American Medical Association was our honored guest and gave a very interesting address on the work and aims of the Woman's Auxiliary. The one aim which she stressed most was the introduction of the Magazine Hygeia to the public. Mrs. McGlothlan said:

"It is my earnest desire that every state and county president and Hygeia chairman will do her utmost to promote Hygeia this year. I shall be quite disappointed if we fail in this most important phase of our work, which is the plan inaugurated by the American Medical Association to educate the public to the viewpoint of the M. D.

Do we wish the laity to have the scientific

viewpoint, or do we prefer to have their thinking shaped only by the unscientific literature constantly falling into their hands? Our answer will be the effort which we put into our educational work.

The promotion of *Hygeia* is the special work in education that the American Medical Association has requested us to do. Let's do it.

GREETINGS FROM YOUR NEW STATE PRESIDENT OF THE WOMAN'S AUXILIARY

To all who were privileged to attend the Annual Meeting of the National Auxiliary in Philadelphia it was evident that the Woman's Auxiliary to the Medical Association is a going concern and one that is proving itself of value.

The State Meeting in East St. Louis was well attended and an increasing interest in Auxiliary affairs was manifested.

For the summer activity some Auxiliaries are having picnic suppers either in a near by park or in the home of some member. One which was very successful in a social way was held in the flower garden of one of the members with the husbands as invited guests.

The program for the year 1931-32 is to be largely educational. This of course will mean that our Auxiliaries will be somewhat like study clubs, but we hope that we can make them so interesting that no one will want to miss one meeting.

Each month the program committee will send to each Auxiliary suggestions and material for study and discussion. The subjects which we have under consideration are the following:

1—Contagious Disease Control with emphasis on Smallpox.

2—Legislation—Medical Practice Act. When Legislature meets—What bills, etc.

3—Health Talks that are being broadcast.

4—Survey of Magazines with regard to their presentation of Medical Practices, costs, etc.

5—Some Economic Aspects of the Practice of Medicine.

6—Child Welfare and Examination of School Children.

7—A thorough Study of the Magazine Hygeia.

8—List of books (fiction) written by doctors or about doctors with review of several.

With these topics each month will be sent one or more prepared papers discussing the subject, with a list of sources of information on the same.

This program is only suggestive to you. If your Auxiliary wishes to take up any other or wishes to follow any other line of work, the officers and committee chairman of the State Auxiliary will be glad to do anything they can to help you with your own program.

If you have in mind a topic to add to this program we have outlined we shall be glad to have your suggestions.

Mrs. T. O. Freeman.

ARE WE FACING SOCIAL CONTROL OF SICKNESS TREATMENT?

The committee on the study of dental practice of the American Dental Association is conducting a study of all phases of sickness insurance in Europe and America.

The committee feels that in the proposed investigation of medical insurance to attempt the separation of the dental from the medical phases would be impossible. The interests of the profession concerned are not and cannot be dissociated. The committee states "that it is fundamental for the profession to realize that whatever happens to the medical profession is, for the dental profession, in the nature of a prediction."

We quote the following from the report of the committee:

"Call it 'Sickness' or 'Health Insurance,' the 'Panel System,' or 'State Medicine,' no legislation has so greatly affected so many people as that for the social control of the treatment of disease. No section has been so deeply affected as the different branches of the professions dealing with the treatment of disease. This applies almost equally to physicians, dentists, nurses and to nearly all the institutions concerned with human ills.

"These various divisions of the *medical profession* must suffer or profit together from the workings of such legislation. It is impossible to separate their fates, even in discussion, and certainly not in programs of action. To emphasize this solidarity the words *'medical profession'* are used to include all those so affected.

"Since Bismark compelled the enactment of the first compulsory social insurance laws in 1883, similar laws have been enacted in practically every known European nation, in Japan and several South American countries, and are under favorable consideration in nearly all other countries, including Canada, Australia and South Africa.

"The International Labor Conference, which includes every nation belonging to the League of Nations, at

its meeting in 1927, adopted an agreement binding all members to introduce *compulsory* sickness insurance as soon as possible.

"While much is made of the distinction between *'compulsory'* and *'voluntary'* systems, there are few of the latter without many compulsory features. The difference in degree is so slight that it is hard to draw the line between them, especially as the voluntary systems are constantly adding compulsory features.

"In the United States, workmen's compensation laws have already given us a system of compulsory accident insurance in all but four states, while a constantly increasing number of states are extending these laws to cover 'occupational diseases.' Many features of compulsory insurance treatment have also been included in recent veterans' legislation. All of these measures affect the practice of dentistry.

"The tendency of such legislation was foreseen by the American Medical Association almost as soon as it began. A report of the Judicial Committee of that Association, which was adopted by the House of Delegates at the San Francisco meeting in June, 1915, made this remarkable analysis and forecast:

" 'The passing of these laws does not mean that some new or special law has been passed to compensate an injured workman under the old common law system, but it means an entirely new legal and social conception of compensation for injury and is, in fact, the beginning of a new social and economic condition in this country.

* * * * * * *

" 'The Council further realizes that in the near future the majority of medical men in this country must face a new social condition in connection with the laws of workmen's compensation in accident and probably in disease. In whatever country the social equilibrium has been upset by new laws on compensation there have followed in the wake of compensation for accidents other insurances tending toward the complete insurance systems of England and Germany.'

"All forms of insurance tend to expand to cover new classes, to give more generous compensation and to extend any service once offered. In Germany this tendency has reached a point where but five per cent. of the medical profession is engaged in private practice. This percentage is higher in other countries having sickness insurance, but in few does it reach fifty per cent.

"This matter falls within the jurisdiction of state legislatures. There are forty-eight of these and it will be a miracle if some do not soon make the experiment, especially in time of industrial depression, which always produces social legislation.

"Such a change would deeply affect the income, professional standards, methods of work, freedom of practice, all relations with patients and nearly every other feature of the lives of all the physicians and dentists, whether they come directly under the operation of the law or not. There is hot dispute as to the nature of these effects. Opponents declare that such legislation degrades the entire healing profession, encourages malingering, reduces incomes, leads to superficial, stereotyped treatment after hasty diagnosis, introduces lay control of professional matters and generally demoralizes all relations with the patient. Advocates urge that it brings increased income, especially to the beginning practitioner, that it brings medical care within the reach of large masses hitherto excluded, makes early diagnosis universally possible, and leads to general betterment of health conditions.

"Part of this disagreement is due to the multitude of insurance systems. These differ, not only as to countries, but every system changes constantly and produces different results at different times. In planning a program in relation to such legislation it is of paramount importance to know whether a certain good or evil result is inherent in the insurance system, or is peculiar to certain times and places. It is also important to know whether the good results can be obtained by other means and especially whether, if insurance is pressed upon this country, it is possible for an organized medical profession to secure such provisions as will avoid its evils.

"It is to obtain the information that will help the entire *medical profession* to meet this possible threat in such a way as to utilize any action that may result to the best interests of the public and the profession that the Committee on the Study of Dental Practice of the American Dental Association is conducting a study of all phases of sickness insurance in Europe and America."

EDUCATIONAL COMMITTEE ILLINOIS STATE MEDICAL SOCIETY

JUNE, JULY AND AUGUST, 1931

SPEAKERS' BUREAU:

19—Requests for speakers from ten types of groups—

Women's Clubs
Rotary Clubs
High School Assemblies
Teachers' Institutes
Hospital Staffs
Nurses Associations
Kiwanis Clubs
Public Meetings on Diphtheria Immunization
Home Bureaus
Y. M. C. A.

These appointments were filled by the following members of the Illinois State Medical Society: H. A. Felts, T. P. Foley, J. J. Donahue, R. O. Hawthorne, G. C. Otrich, W. K. Ford, Aaron Arkin, George W. Irwin, Stuart Adler, Andy Hall, Paul Weber, J. C. Krafft, Robinson Bosworth, E. E. Edmondson, W. D. Chapman, Harold M. Camp.

Physicians of Illinois are requested to let lay

groups in their communities know that the Educational Committee sponsors a Speakers' Bureau for the purpose of supplying health programs.

SCIENTIFIC PROGRAMS:

Do You Know That

The Scientific Service and Educational Committees will arrange programs for your county medical society?

The office of the Educational Committee will send out newspaper announcements of your scientific programs?

The office of the Educational Committee will send out notices of your scientific meetings to your members and physicians of adjoining counties?

This service is yours for the asking?

Scientific programs were arranged for the following counties:

LaSalle—Francis J. Gerty, Sumner L. Koch.

Douglas—Frederick B. Balmer.

Schuyler—George deTarnowsky.

Pike—R. O. Stites.

Warren—Philip Kreuscher, Clinic for Crippled Children.

RADIO:

131—Radio talks were given during this three months period. Note the following timely topics which were discussed by members of the Chicago Medical Society during the four regular weekly broadcasts from WGN and WJJD:

Cyril Hale—Nervousness.

William J. Pickett—Hernia.

Albert W. Seidel—Care of the Baby in Summer.

C. H. Christoph—Sinus Infections and Swimming.

Samuel Taub—Bronchial Asthma, Its Causes and Prevention.

Charles F. Sawyer—Some Facts About the Gall Bladder.

Guy S. VanAlstyne—Abdominal Pain.

William R. Cubbins—Emergency Care of Fractures.

Samuel J. Taub—Hay Fever.

L. Schultz—Lesions of the Mouth.

L. A. Juhnke—Human Death Rate.

B. Barker Beeson—Cancer of the Skin.

Aaron Arkin—What Is Cancer?

William A. Brams—Heart Disease, Its Causes and Prevention.

Hiram J. Smith—Popular Fallacies Concerning Cataract.

Harold A. Rosenbaum—Throat Infections.

Emil J. Stein—Focal Infections.

Earl H. Thomas—Teeth and Health.

Chester C. Guy—Infections and Other Hazards of Swimming; How to Enjoy Your Vacation.

Andrew McNally, Jr.—Cancer.

Harold W. Miller—Obstetrical Necessities.

Sidney A. Portis—The Evils of Constipation.

Howard Wakefield—Heart Disease.

Clement L. Martin—Rectal Diseases.

John P. Coughlin—Functional Convulsions.

Frank Smithies—Indigestion.

J. J. Pflock—The Dangers of Unsupervised Reducing.

F. A. Anderson—Prevention of Disease in Its Most Common Forms.

A. F. Byfield—Indigestion.

Walter S. Siewerth—Goiter.

John B. Haeberlin—Keeping Fit Through the Liver.

George Milles—Migraine.

Virgil R. Stephens—First Aid in Automobile Accidents.

John A. Wolfer—Gallstones.

George C. Turner—Focal Infections.

Gilbert P. Pond—Mental Development During Childhood.

Frederick C. Test—Some Common Affections of the Joints.

A. L. Williams—Diets for Hot Weather.

Joseph M. Blake—Problems of the Hotel Physician.

J. Roscoe Harry—A Plain Talk About Your Heart.

J. Frank Waugh—Skin Diseases Prevalent in Summer.

Clarence W. Rainey—Children's Eyes.

M. Edward Healy—Body Weight.

Glenn J. Greenwood—Adenoids.

Frederick B. Balmer—Menaces to Health.

Arthur H. Conley—Painful Feet.

Clarence Neymann—The Relation of Extroversion and Intreversion to Insanity.

Samuel M. Feinberg—Hay Fever.

R. F. Weissbrenner—Immunization as Health Insurance.

Wm. A. Rosenberg—Ringworm.

PRESS SERVICE:

1,763—Health articles were released to Illinois newspapers.

1,396—Regular press service.

77—Articles released on monthly health column service.

115—Infantile Paralysis articles sent to editors of community newspapers where cases were reported.

One editor writes: "Wish to thank you for your special letter in regard to infantile paralysis. As one or two cases are reported in Schuyler County, I am sure it will be of special interest to our readers."

12—Newspapers in St. Clair and Montgomery Counties re Typhoid Fever.

35—Newspapers in DuPage, Lake, Logan, Rock Island, McHenry Counties, re Whooping Cough.

48—Newspapers, re meeting Madison County Medical Society.

59—Newspapers, re LaSalle County Medical Society.

19—Newspapers, re Summer Round-Up.

2—Association of Commerce, Chicago Medical Society.

35—Health Educational Articles written and approved:

Angina Pectoris.
Lack of Appetite.
Pellagra.
Health and Comfort in Hot Weather.
Fatigue.
Cataracts.
Sun Bathing.
Sinus Infection and Swimming.
Our Emotions.
Pre-School Child.
Tapeworm.
Rectal Diseases.
Noise and Health.
Body Weight.
Animals May Transmit Disease to Man.
Hives.
Postmortem Examination.
Sweating.
Dandruff.
Migraine.
When the Boy or Girl Goes to Camp.
No Cathartics.
Protection Against Smallpox.
Cancer of the Kidney.
Goitre.
Silent Sicknesses.
Functional Convulsions.
Derangements of the Joints.
Superfluous Hair.
In Business for Your Health.
Doctor Kohn and Tuberculosis.
School Begins.
Anesthesia.
Adenoids.
Cutting Down Communicable Disease.

MISCELLANEOUS:

Mr. W. Lawrence Shaw of the American Library Association asked for information about the work of the Educational Committee, particularly interested in the radio programs.

35—Folders of material sent out to speakers and others desiring use of our package library service.

Doctor Andy Hall devoted almost an entire page in the August 15 issue of the Health Messenger to an article explaining the services of the Educational Committee. Several requests came in following the publication of this article, among them the following:

"We read with much interest the article in the Illinois Health Messenger of August 15, 1931 which gives an account of the services offered by your Educational Committee.

"The Committee on Education and Publicity of the San Francisco Heart Association is particularly interested in your lecture and radio work. Have you any radio broadcasts on heart disease and allied subjects which they would be permitted to use in connection with their weekly broadcast on the prevention and relief of heart disease? And do you use the dialogue form of radio broadcast?

"Any help or suggestions along this line in the development of their publicity campaign would be greatly appreciated.

"For your information the San Francisco Heart Association was organized in 1930 to combat heart disease. The Association is sponsored by the local County Medical Society, the Community Chest and the San Francisco Tuberculosis Association."

ANNUAL MEETING OF INTER-STATE POST GRADUATE MEDICAL ASSOCIATION OF NORTH AMERICA

The International Assembly of the Inter-State Post Graduate Medical Association of North America will be held in Milwaukee Auditorium, Milwaukee, Wisconsin, October 19-20-21-22-23, 1931.

PROGRAM

Monday, October 19, 8 A. M.

Diagnostic Clinic (Medical). Dr. Elsworth S. Smith, St. Louis, Mo.

Diagnostic Clinic (Obstetrical). Dr. Irvin Abell, Louisville, Ky.

Diagnostic Clinic (Medical). Dr. Harlow Brooks, New York, N. Y.

Diagnostic Clinic (Surgical). Dr. Frank H. Lahey, Director, Boston, Mass.

Intermission for Review of Exhibits

Diagnostic Clinic (Pediatric). Dr. Alan G. Brown, Toronto, Canada.

Diagnostic Clinic (Medical). Dr. Henry A. Christian, Boston, Mass.

Address: "Chronic Arthritis as an Economic Human Problem." Dr. Robert B. Osgood, John B. & Buckminster Brown, Boston, Mass.

Noon Intermission

1:00 P. M.

THE THYROID GLAND

Address: "The Use of Iodin in Graves' Disease." Dr. Clarence G. Toland, Los Angeles, Calif.

Address: "The Use of Iodin in Recurrent Exophthalmic Goiter." Dr. S. F. Haines, Rochester, Minn.

Address: "The Safeguards in the Technic of Operations on the Thyroid Gland." Dr. Robert S. Dinsmore, Cleveland, Ohio.

Address: "Thyroiditis." Dr. Frank H. Lahey, Boston, Mass.

Address: "Cardiac Irregularities Associated with Diseases of the Thyroid Gland." Dr. Elsworth S. Smith, St. Louis, Mo.

Intermission for Review of Exhibits

OBSTETRICS AND GYNECOLOGY

Address: "Retroversion of the Uterus, and Complete Prolapse of the Uterus." Dr. Irvin Abell, Louisville, Ky.

Address: "Conservative Treatment of Aclampsia." Dr. Otto H. Schwarz, St. Louis, Mo.

Motion Picture: "Suspension of the Uterus for Retro-Displacement." Dr. H. O. Jones, Chicago, Ill.

THE CIRCULATORY SYSTEM

Address: "Mechanism and Transmission of Heart Murmurs with a Special Consideration of 'The Unimportant Murmur.'" Dr. S. Marx White, Minneapolis, Minn.

Address: "Syphilitic Aortitis." Dr. William S. Middleton, Madison, Wisconsin.

Dinner Intermission

7:00 P. M.

Address: "Syndrome of Ayerza." Dr. William Sharp McCann, Rochester, N. Y.

Address: "Circulatory Failure in Acute Infectious Diseases." Dr. Charles A. Elliott, Chicago, Ill.

Address: "Heart Diseases in Children and Their Sequelae." Dr. Alan G. Brown, Toronto, Canada.

Address: "Prognosis of Hypertension." Dr. Louis Hamman, Baltimore, Md.

Address: "Coronary Thrombosis." Dr. Harlow Brooks, New York, N. Y.

Address: "The Diagnosis and Treatment of Adhesive Pericarditis." Dr. C. Sidney Burwell, Nashville, Tenn.

Address: "Aortic Lesions in Relation to Cardiac Physical Signs and Cardiac Function." Dr. Henry A. Christian, Boston, Mass.

Tuesday, October 20, 8 A. M.

Diagnostic Clinic (Surgical). Dr. John F. Erdmann, New York, N. Y.

Diagnostic Clinic: "Toxemias of Pregnancy" and "Antenatal Hemorrhage." Dr. P. Brooke Bland, Philadelphia, Pa.

Diagnostic Clinic (Surgical). Dr. John M. T. Finney, Baltimore, Md.

Diagnostic Clinic (Medical). Dr. Campbell P. Howard, Montreal, Canada.

Intermission for Review of Exhibits

Diagnostic Clinic (Surgical). Dr. F. N. G. Starr, Toronto, Canada.

Diagnostic Clinic (Oto-Laryngological). Dr. Samuel J. Crowe, Baltimore, Md.

Address: "Allergic Diseases." Dr. Warren T. Vaughan, Richmond, Virginia.

Noon Intermission

1:00 P. M.

THE GASTRO-INTESTINAL TRACT

Address: "Peptic Ulcer—A Review of Present Knowledge of Etiology, and Best Methods of Treatment." Dr. John M. T. Finney, Baltimore, Md.

Address: "Surgical Aspects of Carcinoma of the Rectum." Dr. John F. Erdmann, New York, N. Y.

Address: "Cancer of the Stomach." Dr. F. N. G. Starr, Toronto, Canada.

Address: "The Present Status of the Treatment of Hirschsprung's Disease." Dr. Fred W. Rankin, Rochester, Minn.

Address: "Does Peptic Ulcer Cause Permanent Disability?" Dr. William Gerry Morgan, Washington, D. C.

Intermission for Review of Exhibits

OTO-LARYNGOLOGY

Address: "Plastic Surgery of the Nose, Lips and Cheeks." Dr. Gordon B. New, Rochester, Minn.

Address: "Laryngitis." Dr. Fielding O. Lewis, Philadelphia, Pa.

Address: "Diseases of the Ear That Give Rise to Deafness." Dr. Samuel J. Crowe, Baltimore, Md.

Address: "Diagnosis and Treatment of Carcinoma of the Larynx." Dr. William V. Mullin, Cleveland, Ohio.

Address: "Congentital Syphilis." Dr. Isaac A. Abt, Chicago, Illinois.

Dinner Intermission

7:00 P. M.

MALIGNANT DISEASES

Address: "Malignant Diseases in Childhood." Dr. H. F. Helmholz, Rochester, Minn.

Address: "Incidence, Diagnosis and Treatment of the Primary Malignant Tumors of Long Bones." Dr. Dean D. Lewis, Baltimore, Md.

Address: "Radiation Therapy in Intra-Oral Cancer with its Complications." Dr. James M. Martin, Dallas, Texas.

Address: "Infantile Paralysis." Dr. William McKim Marriott, St. Louis, Mo.

Address: "Etiology and Treatment of Low Back Pain from the Mechanistic (Orthopedic) Point of View." Dr. Arthur Steindler, Iowa City, Iowa.

Address: "Recent Advances in the Treatment of Nephritis." Dr. James S. McLester, Birmingham, Alabama.

Wednesday, October 21, 8 A. M.

Diagnostic Clinic (Surgical). Dr. Dean D. Lewis, Baltimore, Md.

Diagnostic Clinic (Medical). Dr. Leonard G. Rowntree, Rochester, Minn.

Diagnostic Clinic (Urological). Dr. Herman L. Kretschmer, Chicago, Ill.

Diagnostic Clinic (Surgical). Dr. Charles H. Frazier, Philadelphia, Pa.

Intermission for Review of Exhibits

Diagnostic Clinic (Surgical). Dr. William E. Lower, Cleveland, Ohio.

Address: "Choice of Anesthetic Methods in Different Types of Patients and Conditions." Dr. John S. Lundy, Rochester, Minn.

Address: "The Influence of Pain and Mortality in Modern Medical Practice." Dr. Charles H. Mayo, Rochester, Minn.

Noon Intermission

1:00 P. M.

Diagnostic Clinic (Surgical). Dr. Fred W. Rankin, Rochester, Minn.

UROLOGY

Address: "Conservative Plastic Procedure in Prostatic Hypertrophy." Dr. Joseph F. McCarthy, New York, N. Y.

Address: "Further Research Studies of the Factors Which Are Conducive to the Production of Prostatic Hypertrophy." Dr. William E. Lower, Cleveland, Ohio.

Address: "Treatment of Carcinoma of the Bladder." Dr. Herman L. Kretschmer, Chicago, Ill.

Address: "The Value and Limitations of Intravenous Pyelography in the Diagnosis of Renal and Ureteral Diseases." Dr. Bernard H. Nichols, Cleveland, Ohio.

Address: "Diagnosis and Treatment of Tumors of the Testicle." Dr. Charles C. Higgins, Cleveland, Ohio.

Intermission for Review of Exhibits

THE CENTRAL NERVOUS SYSTEM

Address: "Experience Gained in One Hundred Operations Under Local Anesthetic for the Permanent Cure of Trigeminal Neuralgia Major." Dr. William T. Coughlin, St. Louis, Mo.

Address: "Encephalography and Ventriculography—Methods and Interpretation." Dr. Charles H. Frazier, Philadelphia, Pa.

Dinner Intermission

7:00 P. M.

Address: "Symptomatology, Prognosis and Treatment of Minor Neuroses and Psychoses." Dr. Louis J. Karnosh, Cleveland, Ohio.

Address: "Pulsating Exophthalmos with Special Reference to Surgical Treatment." The Joseph Schneider Foundation Presentation. Dr. John M. Wheeler, New York, N. Y.

Address: "Suggestions From Medical Psychology in the Field of General Medicine." Dr. William A. White, Washington, D. C.

Address: "Water in Relation to Health and Disease." Dr. Leonard G. Rowntree, Rochester, Minn.

Address: "Water and Chemical Balance in Surgery." Dr. Thomas G. Orr, Kansas City, Kansas.

Thursday, October 22, 8 A. M.

Diagnostic Clinic (Surgical). Dr. Waltman Walters, Rochester, Minn.

Diagnostic Clinic (Medical). Dr. Russell L. Cecil, New York, N. Y.

Diagnostic Clinic (Pediatric). Dr. William McKim Marriott, St. Louis, Mo.

Diagnostic Clinic (Surgical). Dr. Arthur Dean Bevan, Chicago, Illinois.

Intermission for Review of Exhibits

Diagnostic Clinic (Medical). Dr. Russell L. Haden, Cleveland, Ohio.

Diagnostic Clinic: "Differentiation of Benign and Malignant Tumors of the Breast." Dr. Burton J. Lee, New York, N. Y.

Noon Intermission

1:00 P. M.

THE RESPIRATORY SYSTEM

Address: "Roentgenological Diagnosis of Early Tuberculosis." Dr. B. R. Kirklin, Rochester, Minn.

Address: "Injuries of the Lungs and Pleura." Dr. Frank K. Boland, Atlanta, Ga.

Address: "Diagnosis and Treatment of Mediastinal Tumors." Dr. Stuart W. Harrington, Rochester, Minn.

Address: "Bronchial Obstruction, Partial or Complete, as shown by the Roentgen Ray Examination." Dr. Willis F. Manges, Philadelphia, Pa.

Address: "Abscess of the Lung." Dr. Carl A. Hedblom, Chicago, Illinois.

Address: "Recent Advances in Diagnosis and Treatment of Pneumonia." Dr. Russell L. Cecil, New York, N. Y.

Address: "Surgical Treatment of Pulmonary Tuberculosis." Dr. Alton Ochsner, New Orleans, La.

Intermission for Review of Exhibits

FRACTURES

Address: "The Treatment of Fractures." Dr. Melvin S. Henderson, Rochester, Minn.

Address: "Operative Arrestment of Longitudinal Growth of Bones; Indications for and Results of." Dr. Dallas B. Phemister, Chicago, Illinois.

Address: "The Treatment of Ununited Fractures." Dr. Edwin W. Ryerson, Chicago, Ill.

Address: "Purpura and Pathological Hemorrhage." Dr. Russell L. Haden, Cleveland, Ohio.

Dinner Intermission

7:00 P. M.

THE BREAST

Address: "The Choice and Technic of Surgical Methods in the Treatment of Carcinoma of the Breast." Dr. Arthur Dean Bevan, Chicago, Illinois.

Address: "Paget's Disease of the Breast." Dr. Edmond M. Eberts, Montreal, Canada.

Address: "Therapeutic Problems of Syphilis." Dr. Paul A. O'Leary, Rochester, Minn.

Address: "Significance of Hyper- and Hypo-Metabolism." Dr. James H. Means, Boston, Mass.

Address: "Bright's Disease." Dr. Hilding Berglund, Minneapolis, Minn.

Address: "Some Aspects of Asthma." Dr. Robert D. Rudolph, Toronto, Canada.

Friday, October 23, 8 A. M.

Diagnostic Clinic (Surgical). Dr. E. Starr Judd, Rochester, Minn.

Diagnostic Clinic (Medical). Dr. John H. Musser, New Orleans, La.

Diagnostic Clinic (Surgical). Dr. John B. Deaver, Philadelphia, Pa.

Diagnostic Clinic (Medical). Dr. Cyrus C. Sturgis, Ann Arbor, Michigan.

Intermission for Review of Exhibits

Diagnostic Clinic (Surgical). Dr. George W. Crile, Cleveland, Ohio.

Diagnostic Clinic (Medical). Dr. Elliott P. Joslin, Boston, Mass.

Address: "The Importance of Preserving or Restoring Function in Performing Radical Operations on the Large Intestine and Rectum." Dr. William J. Mayo, Rochester, Minn., and Dr. C. F. Dixon, Rochester, Minn.

Noon Intermission

1:00 P. M.

THE GALL-BLADDER AND LIVER

Address: "Different Forms of Jaundice and their Significance." Dr. James E. Paullin, Atlanta, Ga.

Address: "Malignant Lesions of the Gall-Bladder." Dr. E. Starr Judd, Rochester, Minn.

Address: "Differentiation of Biliary and Renal Calculi." Dr. William D. Haggard, Nashville, Tenn.

Address: "The Medical Treatment of Gall-Stones and Cholecystitis." Dr. John H. Musser, New Orleans, La.

Address: "Surgical Aspects of Obstructive Jaundice." Dr. Waltman Walters, Rochester, Minn.

Address: "Acute Yellow Atrophy of the Liver—Incidence, Pathogenesis, End-Stages." Dr. M. A. Glankenhorn, Cleveland, Ohio.

Address: "The Functionless Gall-Bladder." Dr. John B. Deaver, Philadelphia, Pa.

Intermission for Review of Exhibits

Address: "Present Aspects of Treatment of Pernicious Anemia." Dr. Cyrus C. Sturgis, Ann Arbor, Michigan.

Address: "Indications for and Clinical Results in Denervation of the Adrenal Gland." Dr. George W. Crile, Cleveland, Ohio, and Dr. E. P. McCullagh, Cleveland, Ohio.

Address: "Complications and Sequelae of Diabetes." Dr. Elliott P. Joslin, Boston, Mass.

For detailed information write Dr. Edwin Henes, Jr., 759 N. Milwaukee St., Milwaukee, Wisconsin.

NEWLY APPOINTED CONSULTING STAFF OF THE CHICAGO STATE HOSPITAL

CONSULTING STAFF

Surgery	Chas. E. Humiston, President 5533 Race Avenue 449 N. Central. Phone Austin 0085 Geo. W. Post, Jr. 4010 W. Madison St. Phone Kedzie 5175 Homer W. Humiston 1044 Lake St., Oak Park, Ill. Phone Euclid 284
Orthopedic Surgery	Thos. Meaney 5430 W. Madison St. Phone Austin 0730
Oral Surgeon	L. W. Schultz Suite 1925, Marshall Field Annex Bldg. Wabash Ave. and Washington St. Phone Central 5129
Physical Therapy	John Coulter Northwestern Univ. Medical School Phone Superior 4500, Local 253
Internal Medicine	Thos. P. Foley, Secretary 1505 N. Menard Ave. Phone Merrimac 6700 Marshall Field Annex Phone Central 6624 Jas. G. McGrath 4100 W. Madison St. Phone Randolph 6800
Eye, Ear, Nose, Throat	Leo J. Steiner 1820 S. Halsted St. Phone Canal 2109 Edw. F. Garraghan 4601 Broadway Phone Longbeach 4408
Obstetrics	Louis Faulkner 334 N. Parkside Ave. Phone Austin 0089 Milton J. Summerville 137 Marion St., Oak Park. Phon Euclid 610; Belmont 7509—1269
Genito-Urinary	Harry J. Dooley 25 E. Washington St. Phone Central 8620. 17 S. Crawford Ave. Phone Kedzie 0733
Dermatology	M. S. Fink 4458 W. Madison St. Phone Austin 9800 B. B. Beeson 5719 Midway Park. Phone Austin 3194 55 E. Washington St. Phone State 5522
Pathologist	E. C. Piette 426 N. Taylor Ave., Oak Park, Ill. Phone Village 7208J

MULTIPLE MYELOMA AND DIABETES INSIPIDUS

Mark J. Bach, Milwaukee, and William S. Middleton, Madison, Wis. (*Journal A. M. A.*, Aug. 1, 1931) report an instance of the coincidence of gross pathologic changes in the bones and diabetes insipidus. Of particular significance were the possible changes in bony structures about the sella. Whatever the interrelationship between the bony lesions and the disturbance in water metabolism, a further example is added in the case of multiple myelioma with associated diabetes insipidus.

Original Articles

THE ROLE OF PROPHYLAXIS IN OBSTETRICS*

FRANK F. MAPLE, M. D.
CHICAGO

Our obstetrical death rate is today 0.68%. Of this 0.43% is puerperal and preventable. In this country one out of every 150 mothers dies of the complications of pregnancy or the accidents of labor. Twenty thousand women die in the United States every year of puerperal infection and obstetrical accidents. Three women bleed to death every day in the United States as a complication of labor. For every patient who succumbs it is not too much to claim that 40 are seriously ill; or, in other words, that the annual puerperal morbidity in this country will run 250,000.

Eclampsia together with the other toxemias of pregnancy accounts for 26% of the childbirth mortality. Of these, the present causes of mortality and morbidity, are sepsis, toxemia and hemorrhage; and ¾ of all three can be prevented by proper application of our already acquired knowledge.

We have then to consider puerperal infections, the obstetrical accidents and the toxemias of pregnancy from the standpoint of prophylaxis. Our interest must begin when we are first called to the case—complete general examination and obstetrical diagnosis to be made at this time. This must include blood and urine with a rechecking at each succeeding visit, which should be made as often as the individual case requires. We must know her family history, her own past history, especially as to her contagious diseases and previous infections, her marital history, and the venereal history of her husband. From an obstetrical standpoint, the following questions are to be answered:

1. Has she a normal pelvis?
2. Has she heart disease?
3. Has she kidney disease?
4. Has she infective foci of disease?
5. Has she syphilis?

The type of pelvis will usually indicate the type of delivery, and may be the underlying factor in an abnormal presentation. External pelvimetry is of considerable service—43.6% of such cases with small measurements require operative interference. Internal pelvimetry by the Skutch method is used. These measures are of distinct service in estimating the margin of safety in the size of proportions in carrying out a trial labor. X-ray pelvimetry is useful and should prove more so as we arrive at a standard technique—it gives a fair idea as to the relation of the fetal head to the pelvis. The head, however, is the best pelvimeter.

We must know her heart condition. Is it normal, or is there myocardial or valvular disease? Our best guide is the heart tolerance of muscular activity rather than our stethoscopic findings. Practically all compensated hearts will go through the labor. Restored compensation with strict care will carry the work of normal labor. Seldom does the heart call for an interruption of pregnancy. Such interruptions are practiced less each year than in preceding years.

Are her kidneys capable of doing the work of two individuals? The kidneys are so often the underlying factor in the toxemias and eclampsias. Many of our surprise eclampsias occur in our healthy specimens, from whom we expect normal deliveries. The routine examination in the pre-natal clinic should include the complete examination of the blood, examination of the ocular background, and estimation of the daily output of chlorides. This can be supplemented by testing the functional flexibilities of the kidneys. More than ½ of the deaths from eclampsia are attributed to non-detection of excessive albuminuria.

Infective foci discovered during early pregnancy should be cleared up. Such infection later in pregnancy would best not be stirred up lest we cause a condition worse than that already existing. Routine Wassermann examination gives us unreliable information in pregnant women. A positive Wassermann without clinical evidence does not indicate active auto-syphilis treatment, especially by the arsenicals. Mercury and potassium iodide are justifiable in such cases.

Forty-three per cent. of our childbirth death rate is laid to puerperal infection—a preventable

*Read before the Section on Surgery, Eighty-first annual meeting, Illinois State Medical Society, East St. Louis, May 6, 1931.

disease, caused usually by infections from without, though infections from the patient's own body are by no means excluded. Prevention of such infection is best arrived at by following these rules of hygiene of pregnancy.

1. Clear up local infection.
2. Improve resistence. Add good nursing, liquid diet, sponging, and sedatives.
3. Conduct labor by simple aseptic technique. Rectal examinations always. The only indications for vaginal examination being the prolapse of the cord, hemorrhage, or stopped labor.
4. Vaginal examination only after regular surgical preparation, as good as you would use for a laparatomy.
5. Limit obstetrical wounds, and prevent their infection. Trauma is the most important cause of fatal sepsis.
6. Do not hurry normal labor.
7. Conserve the bag of waters.
8. No bearing down until dilated.
9. No ergot until placenta is out.
10. Do not force crede.
11. Repair all tears and espisiotomy wounds.
12. Limit forceps to strict indications.

A woman will usually recover from her labor unless molested by meddling accoucheurs. Her natural immunity will protect her from the mild auto-infections which she may incur. The physician should carefully avoid those conditions which render the natural flora of the vagina virulent and invasive and allow their transplanting to new areas of the birth canal, which are the seat of tears and of tissue destruction. He will avoid excessive bruising of the parts, and over prolongation of labor. He will preserve the bag of waters as long as possible. The retention of pieces of placenta in the uterus with shreds of membrane hanging down into the vagina may form a bridge by which bacteria may mount into the uterus. Hetero or exogenous infection is so often blamed when a case develops fever. Infected material introduced into the birth canal during late pregnancy or labor or before the completion of the third stage is the usual real factor in puerperal infection.

There are four agents which infect the case, the most common being the physician or midwife—75%—which means that we, ourselves, are to blame for ¾ of puerperal infection by failures of technique. The next in order of incidence is the patient herself, by self-examination or manipulation of the parts. The nurse accounts for only a small percentage, and the good hospital with well regulated maternity as a factor is negligible. The patient must be instructed in body hygiene and local cleanliness. Coitus must be forbidden in the later months.

Three principles—they are old and they are good—should be followed in the prevention of puerperal infection:

1. Preserve the general immunities.
2. Preserve the local immunities.
3. Maintain the strictest possible aseptic technique.

The nervous force must be preserved, excessive bleeding during labor must be prevented—blood is valuable. There is a physiological loss in every labor—any increase becomes pathological and loss of blood invites exhaustion, increases acidosis, reduces resistance, and allows old infections to light up. Anemic patients are liable to thrombosis and embolism. Limit as far as possible the puerperal wounds. An old surgical principle—"Do not traumatize"—applies in obstetrics. The necessary obstetrical wounds must be protected. Internal examinations made only when indicated must have the same precautions as when opening the abdomen. A labor must be conducted by rectal and external examination, unless the aforementioned indications call for a vaginal examination, then do not hesitate to make it. If the tract is believed to be infected, mercurochrome in a 5% alcoholic solution or hexylresorcinol solution—20%—may have some value in killing surface bacteria.

Conduct the third stage on a physiological basis, interfering only when indicated, and such interference must be dictated by the existing conditions. Make manual removal of the placenta only if there is excessive uterine bleeding or pathological adhesions, remembering the 10% mortality rate which such manipulation carries. After operative deliveries an examination of the tract is advisable. Repair all lacerations carefully. Examine the placenta and membranes—very important information in case of a later puerperal infection. Following the completion of the third stage, the parturient canal is left

entirely alone, no internal examination, no douching, only external vulvar sepsis.

The choice of anesthesia for operative work is imporant. Infiltration anesthesia with novocaine for Cesarian section is always safe. Ethylene gas anesthesia has few contra-indications, always remembering that general anesthetics add to the body toxins, and any of the pregnancy toxemias are better handled without general anesthesias. Most of the socalled ether pneumonias are really exposure pneumonias.

Injuries to mother and child should be prevented. Mothers can be (and are) injured beyond repair, and the child harmed so seriously that its future is hampered. Avoid haste and the frenzy of operating when seized by the obsession to pull on anything available to deliver the child. Deliver slowly, using art rather than strength.

The toxemias which include eclampsia account for 25% of our maternal mortality. F. H. Falls says eclampsia is a disease of neglect and can be wiped out by intelligent pre-natal care. This view does not coincide with that held by Davis, Edgar, and Williams. Prenatal care is reducing this eclampsia rate every year. We must heed the findings, disturbances of special senses, especially of vision, muscular twitchings, headaches, nausea, vomiting, epigastric pain, edema of the feet and eyelids, pasty color, fetid breath, high arterial tension, exaggerated reflexes, diminished urine with casts and low urea output.

Rational prophylaxis requires a known cause for the disease. This we do not always have, but much can be accomplished by prevention. Every pregnancy is a suspect. Family history is helpful, paying particular attention to insanity, alcoholism, eclampsia in the mother, and instability in the nervous system which may lead to disturbances of the metabolism. If the symptoms of toxemia appear a strict diet is indicated with enough nitrogenous material to sustain life, in the form most easily assimilated, and that will give the least amount of waste material for the kidneys. The patient should be put to bed in complete rest, bowels kept active by saline cathartics, liquids freely, with fresh air in plenty.

If we are to lower our maternal mortality in this country, we have to deal with three most important causes of such mortality and morbidity, which as before mentioned are sepsis, toxemia, and hemorrhage. We acknowledge our inability to successfully treat any one of the three, but we believe we can prevent almost all of them. If so, the predominant factor in dealing with our high maternal mortality which has been the subject of lay discussion of recent years, lies in our increasing attention to prophylaxis in obstetrics.

826 East 61st Street.

DISCUSSION

Dr. F. N. Wells, Pittsfield: I would commend this excellent paper, and especially the calling our attention to the "rules of obstetrics," which surely cannot be emphasized too much, but there are some things it seems to me the essayist has left entirely aside. I think some of the statistics so widely circulated in this country, and with an evident purpose of showing the great need of Sheppard-Towner and similar laws are largely erroneous because they include the work of incompetent midwives, and also the cases that are unattended. It would be interesting to know what the essayist's mortality has been. I do not presume it has been high. When I talk with veterans of many years in obstetric work, as I have talked with several during this meeting, and when, pardon me, I consider my own record, I am satisfied that most general practitioners are doing obstetrics well, as it comes to them to do, and that the mortality rate in the country, in the towns and small cities is not high. This may be due to the fact of the mother's acquired immunity to her surroundings—in her own home, where so many of our cases occur, and which immunity does not protect her if she is taken to a hospital, nor is it evident in the homes in the larger cities.

Dr. Jesse T. McDavid, Decatur: I had a very interesting case this summer. The patient, a week after delivery, had a profuse hemorrhage. On examination I found a fibroid tumor of the uterus. Following this she became violently insane. The insanity persisted in spite of everything we did for her, medically. Five weeks after the child-birth we did a hysterectomy and the insanity cleared up. I think conditions like this may have something to do with the mortality of obstetrics.

Dr. Charles B. Reed, Chicago: The paper is a very beautiful resumé of the work that we are doing in educational obstetrics and the Doctor has covered the field very satisfactorily.

One of the gentlemen called attention to the fact that a great many patients came to him and to many other practitioners only in the act of labor or in the last stages of same. That is only too often the case. It not infrequently happens that these cases have disasters follow that are not reported. We have in Chicago a large series of statistics without deaths. We know in many cases those deaths took place in other institutions to which the patients were quickly transferred.

We know in other instances these deaths could be prevented by prenatal care, the prenatal care which Dr. Maple has so carefully outlined. It seems to me we cannot too frequently and too religiously observe the rules which Dr. Maple has laid down and we should follow them out with as much care and attention as our own facilities will permit.

Dr. J. J. Gill, Chicago: This paper certainly covers the prophylactic handling very carefully and very thoroughly. There are, however, some things in obstetrics which must be considered and which must account for our mortality list and yet are not preventable. I refer more particularly to the monstrosities and abnormal children, of which unfortunately I have had a large number with which to deal. A few cases recited perhaps may illustrate this point.

Just the other day I delivered a woman of a hydrocephalic baby with spina bifida and clubfeet. I had delivered for her just a year ago a baby with anencephalus and spina bifida. In another case, I delivered two babies, both anencephalic. Recently, I delivered a baby that had generalized edema. Just why this generalized edema developed I do not know. The diagnosis was made by palpation and x-ray before delivery. Recently, I delivered a baby with absence of one hand. Some years ago I delivered a baby with the right arm off at the elbow and the right leg off at the knee. I do not know how to account for these things and no one else seems to know, but they must be considered in the mortality list of infants. I hope at some time there will be some way of learning about their etiology and preventing their formation.

Wassermann blood tests were negative in all these cases.

Dr. Edith Lowry, St. Charles: I would like to ask the last speaker if he had taken Wassermann tests on these mothers.

Dr. Gill: In the large number of monstrosities I have and none of them have shown any syphilis.

Dr. Frank F. Maple, Chicago (closing): We use pituitrin routinely after the baby is born, one ampule as soon as the head is delivered, which can be repeated in the present of hemorrhage and which is indicated if the hemorrhage be due to uterine atony. Pituitrin is sometimes indicated in multiparous women in the presence of atony when there is nothing in the way of spontaneous delivery with the head low and cervix dilated.

This is the obstetrical mortality and morbidity which we have in America and we cannot debate these facts. We talk to each other about long series of cases without maternal deaths. I remember Dr. Gill reading a paper some years ago covering 500 consecutive obstetrical cases, delivered in the home. In that 500 there were many monstrosities, and there was a considerable child mortality. I believe he reported no maternal mortality. Dr. Gill has done a lot of obstetrics and good obstetrics.

We must do the best obstetrics we know and will then have some bad luck. We now have this mortality. If this is to be lowered, it is our problem, and there is no use trying to pass it on. The midwife problem is always with us. There is no use discussing this problem before a group of doctors. We must take this up with our legislators. We must improve our midwives, but let us not neglect ourselves.

LOWERING THE MORTALITY AFTER OPERATIONS ON THE BILIARY TRACT*

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To reduce the operative mortality as closely as possible to zero must always be the ambition of surgeons. During the last quarter century the operative mortality for most operations has been greatly decreased, but there are still many problems which must be solved before we can assure patients that there is little or no danger connected with even some of the more common surgical procedures. In the case of the biliary tract the operative mortality of 16 per cent for cholecystectomy, recorded in 1890 by Courvoisier,[1] has been greatly reduced until now it is within respectable limits in most clinics. The general reduction of postoperative mortality and the reduction of mortality after operations on the biliary tract have both been accomplished because surgeons have become more "physiologically minded." One might cite, for example, the fact that the elimination of surgical shock as a source of danger after ordinary operations has been due to knowledge laboriously acquired by the physiologists and the "physiologically minded" surgeons. This knowledge has concerned itself with such fundamental questions as blood pressure, blood volume, blood transfusion, anesthetics, etc. Again one might mention the remarkable effect on general operative mortality which has been caused by the large mass of fundamental knowledge acquired concerning the kidneys and particularly concerning methods of studying their functions. When Richard Bright, nearly a century ago, found that the urine from a patient coagulated when boiled in a teaspoon over a spirit lamp he unwittingly made a great contribution to our methods of lowering opera-

*Oration in Surgery at Annual Meeting, Illinois State Medical Society, at East St. Louis, May 6, 1931.

1. Courvoisier, L. G.: Casuistisch-Statistische Beiträge zur Pathologie und Chirurgie der Gallenwege, 1890, Leipzig, Vogel.

tive mortality. Everyone knows now that a patient with badly damaged kidneys is a very bad risk for any sort of operative procedure. The elaborate methods for estimating how the kidneys are carrying on their work, which have been developed from the crude method employed by Bright, seemed to many clinicians during the period of their development to be too cumbersome for practical use. Familiarity with the methods, however, has made the cumbersomeness less apparent and today no surgeon can expect to have a respectable operative mortality unless he employs some of these elaborate methods of gauging the functions of the kidneys in a suspected case of renal damage.

In the case of operations on the biliary tract we are concerned not only with all of those factors which ordinarily play a rôle in surgical mortality but we have to take into special consideration the question of the liver. In every case of infection of the biliary tract there is apparently more or less involvement of the liver by the infection. In 1918 work was published by the present author[2] which showed that even in an ordinary case of subacute cholecystitis there is an interlobular inflammation of the liver which is more or less diffuse but is more pronounced in the right lobe than elsewhere. This inflammation seems to be a pericholangitis and it extends into the lobule even around the finest bile capillaries in the more extreme cases. This process seems to be essentially an infection of the lymphatics around the bile channels.[3] The fact that this type of hepatitis is frequently found in association with cholecystitis and other inflammations of the biliary tract has been shown also more recently by others, notably by Heyd,[4] by Moynihan[5] and by Flint.[6] In those cases in which jaundice is associated with cholecystitis but without demonstrable obstruction of the common bile duct it seems probable that the jaundice is due to an obstruction of the intrahepatic bile ducts caused by the type of inflammation which has just been mentioned. The fact that an actual hepatitis can be demonstrated to occur simultaneously with a cholecystitis indicates strongly that the possibility of the presence of a damaged liver must always be taken into consideration when dealing with a case of cholecystitis.

The importance of the necessity of considering the liver, particularly in cases of disease of the biliary tract, lies in the fact that it is a vital organ in the sense that life cannot go on without it. One might perhaps even say that the liver is more necessary to our existence than the kidneys because it is well known that life can go on for about a week without both kidneys but that it can go on for scarcely more than twenty-four hours without the liver. For that reason, therefore, whenever the liver is badly damaged its functions may be sufficiently jeopardized to make life uncertain if any severe additional strain is put upon it which might reduce its activity still further. It would, therefore, be of inestimable value to us as practical surgeons if we had at our disposal an array of methods for gauging the condition of the liver similar to the exact and satisfactory methods which we now have for gauging the condition of the kidneys.

For the most part the only methods that we have at present for examining hepatic function of the liver have been different means of crudely estimating the excretory function of the organ by means of various dyes. These methods were introduced and have been used very largely in the hope that they might be of aid in the diagnosis of particular lesions of the liver. But it is well known that in general, disappointment has followed their use for this purpose. We have, however, somewhat accidentally come to the conclusion that estimations of the excretory power of the liver are of great importance in determining the operative risk. For this purpose we now use phenoltetraiodophthalein (isoiodeikon) which has the ability not only of making the gall-bladder visible to the x-ray but also imparts a purple stain to the serum after the latter has been slightly alkalinized. Tetraiodophenolphthalein is not satisfactory to use as a means of studying the excretory function of the liver because it does not stain the serum. When the phenol-

2. Graham, E. A., Hepatitis: A Constant Accompaniment of Cholecystitis, Surg., Gynec. and Obst., 1918, 26, 521.

3. Graham, E. A., and Peterman, M. G.: Further Observations on the Lymphatic Origin of Cholecystitis, Choledochitis and the Associated Pancreatitis, Arch. Surg., 1922, 4, 23.

4. Heyd, C. G., Killian, J. A., and MacNeal, W. J.: The Liver and Its Relation to Chronic Abdominal Infection, Beaumont Lectures, 1924, C. V. Mosby Co., St. Louis.

5. Moynihan, B.: The Gall Bladder and Its Infections, Brit. Med. Jour., 1928, 1. 1.

6. Flint, E. R., Association between Gall-Bladder Lesions and Hepatitis in Human Subject, Brit. M. J., 1930, i. p. 1041. Also, Editorial, Hepatitis in Biliary Disease, Brit. M. J. 1930, II, p. 26.

tetraiodophthalein is injected intravenously in an amount sufficient to produce a cholecystographic shadow (a dose of about 2.5 grams to the average adult) a load is put upon the liver which is considerably greater than is the case with the ordinary doses of such substances as phenoltetracholorphthalein, bromsulphalein, etc., substances which have been ordinarily used for the determination of the excretory power of the liver. For example, this dose of phenoltetraiodophthalein is about eight times that which has ordinarily been employed for phenoltetrachlorphthalein. This larger dose is probably advantageous because if we wish to measure the ability of an object to do work it is necessary to give that object enough work to perform to make the test adequate. No particular virtue for phenoltetraiodophthalein is claimed as a method of studying the excretory power of the liver. Probably the same information could be obtained with bromsulphalein or phenoltetrachlorphthalein if these were given in larger amounts.*

After we had begun to use phenoltetraiodophthalein as a routine agent for cholecystography we happened to have four unexpected deaths after operations for simple cholecystectomy. These deaths occurred in patients who apparently were good risks for operation. At autopsy in none of these patients could an adequate cause for death be found except a badly damaged liver. In reviewing all of the particulars of these cases we found that in all of the fatal cases there had been a high retention of the dye. Whereas in the normal individual there is a retention of from ten to fifteen per cent of the dye within a half hour, of these four cases just mentioned two had retentions of ninety per cent. in the half hour, one of seventy per cent and the fourth of sixty per cent. These findings alone seemed to be significant, especially when we found that those patients who did not have much retention of the dye, in other words who had good excretory functions, went through their operations in a satisfactory manner. Fortunately also it was possible to obtain additional information of value concerning the study of the liver in these fatal cases because at operation small segments of liver had been removed for microscopic examination. For many years it has been my custom frequently at operation on the biliary tract to remove a small segment of liver for purposes of microscopic examination. Since we had in these four fatal cases such segments of liver which were placed in fixative solution while still living it was reasonable to conclude that the changes observed were not due to autolysis or to postmortem decomposition but were representative of the actual state of affairs in the liver at the time. The changes which were noticed in the livers in these four cases were chiefly those of extreme cloudy swelling together with some edema. In addition there were evidences of periportal inflammation which have been mentioned above as being characteristic changes in association with cholecystitis. In other words there seemed to be a very definite correlation between the high retention of the dye in each case and the presence of marked histological changes in the liver.

In view of the striking relationship alluded to above, which we found to exist between a high retention of dye and the danger of death from operation on the biliary tract, we decided that in the future we would not operate upon patients who showed a high retention of the dye. We decided that on the contrary we would postpone such operations until we could have more assurance that there would be less risk in operating upon them. Accordingly patients who showed a retention of dye of more than fifty per cent in the half hour were placed upon a strict course of preparation for the operation. They were put to bed and systematically given large doses of carbohydrate in order to insure a storage in the liver of a large amount of glycogen. It is well known that it is very necessary for the liver to be abundantly supplied with glycogen in order to carry on its normal functions.[7] If the patients were unable to tolerate much carbohydrate by mouth it was administered in the form of glucose intravenously. An effort was

*Much of the work in elaborating the details of estimation of the hepatic excretory rate by means of phenoltetraiodophthalein (isoiodeikon) has been done by Dr. Warren Cole. The technique is given in detail in our book, "Diseases of the Gall Bladder and Bile Ducts," Lea & Febiger, Philadelphia, 1928, and also in "Surgical Diagnosis," edited by E. A. Graham, vol. 3, pp. 515-524, W. B. Saunders Co., Philadelphia, 1930. Colorimeters and circulars of instruction are supplied by the Mallinckrodt Chemical Works of St. Louis.

7. Graham, E. A.: The Resistance of Pups to Late Chloroform Poisoning in Its Relation to Liver Glycogen, Jour. Exper. Med., 1915, 21, 185.

See also Rosenfeld, G.: Fettbildung, Ergebn. d. Physiol., 1903, 2, pt. 1, 50.

made to provide the adult of ordinary size with approximately one hundred grams of glucose in the twenty-four hours. In addition, in accordance with an idea suggested first by Lamson, Minot and Robbins[8] small amounts of calcium were administered. This was done not because of any bearing on the question of the coagulability of the blood but because Lamson found experimentally that the repair of livers which had been damaged by carbon tetrachloride was greatly hastened by the use of small amounts of calcium.

A striking reduction in our operative mortality in cases of disease of the biliary tract has been observed since instituting this regime. We found that patients who showed a high retention of the dye after a course of preparation such as has been mentioned would almost invariably show a marked improvement in the hepatic excretory function after two or three weeks. For example, it was not unusual to observe that after a period of this length a patient who originally had a retention of as high as ninety per cent in the half hour might improve to such an extent that the retention would be only thirty or forty per cent in the half hour. Such patients could then be operated upon safely. This point is well shown in our operative mortality. For example, in the three year period before the recognition of the importance of estimating the excretory function of the liver our average mortality in cases of simple cholecystectomy was six per cent. in 216 cases. In the last three years in 224 cases of simple cholecystectomy our mortality has dropped to 0.4 per cent. A striking reduction has also occurred in the mortality following the operations on the common duct, namely, a drop from 7.7 per cent. to 2 per cent. The striking change in the results after simple cholecystectomy is shown in the following table:

Hospital Mortality After Cholecystectomy

For Three Years Preceding Use of Phenoltetraiodophthalein

Year	Cases	Deaths	Percentage
1925	78	4	5.1
1926	63	7	10.1
1927	75	3	4.0
Total	216	14	6.0

For Three Years in Which Test Has Been Used

Year	Cases	Deaths	Percentage
1928	90	0	0
1929	68	0	0
1930	66	1	1.5
Total	224	1	0.4

In general the same type of patients were operated on in the last three year period as in the first three year period. The operations also were not performed by one individual but by various members of the Department of Surgery. No patient was declined an operation on the biliary tract except one individual who, in addition to advanced years, had a bad myocarditis with decompensation, angina pectoris and marked arteriosclerosis. In the other patients, who seemed at first to be bad risks, the operation was merely postponed in accordance with the suggestions which have been made above. Many of the patients in the last three years as well as during the first three years were old. We feel, therefore, that an intelligent use of the dye test for determining the excretory function of the liver may be of very great significance in providing us with one more means of estimating the operative risk.

This study has confined itself merely to operations on the biliary tract but doubtless the same ideas would hold for any kind of operations. A patient with a very badly damaged liver would almost certainly be a bad risk for even a trivial operation. The present methods of estimating the state of the liver are of about the same degree of crudeness as Richard Bright's test of the function of the kidneys by boiling the urine over a spirit lamp. When the methods of examining the liver have been developed to the same high point of refinement and accuracy that has been reached in the case of the methods of studying renal function we may confidently expect to have added to our surgical armamentarium another means of greatly reducing the mortality after all operations.

Of course, all of the deaths after operations on the biliary tract are not due to disturbed functions of the liver. Some are definitely due to conditions above the diaphragm, notably to myocarditis and to pulmonary complications. Simultaneously with our attempt to reduce the mortality due to disturbances of hepatic function we have also been interested in the ques-

8. Lamson, P. D., Minot, A. S., and Robbins, B. H.: Prevention and Treatment of Carbon Tetrachloride Intoxication, J. A. M. A., 1928 (Feb. 4), 90, p. 345.

tion of attempting to reduce the mortality from pulmonary complications. Soon after Henderson, Haggard and Coburn[8] published their important work which showed that ether and other inhalation anesthetics could be rapidly removed from the body by inhalation of carbon dioxide we proceeded to apply this suggestion to all of our abdominal cases after operation. At first this was done without any reference to the question of preventing pneumonia but later, after the stimulating publication of Coryllos and Birnbaum,[9] it seemed that possibly it might have been of benefit for that purpose at our hands also. These latter authors have produced a considerable amount of evidence which indicated not only that postoperative pulmonary atelectasis is due usually to an obstruction of the main bronchus by mucus but they also brought evidence to indicate that ordinary pneumonias, both of the lobar and bronchial type, perhaps often begin as a pulmonary atelectasis.[10] The effect of carbon dioxide on the respiratory center results, of course, in a forced inspiration. The administration of carbon dioxide to a patient, therefore, might on theoretical grounds seem to be of value in preventing pneumonia because by making the patient breathe deeply it would prevent atelectasis. We convinced ourselves some years ago that some degree of pulmonary atelectasis is very common after cholecystectomy by resorting to the simple means of taking x-ray films of ten consecutive patients on the day following the operation. In each case we found an abnormal elevation of the right side of the diaphragm. There seemed good reason, therefore, for making a routine practice of administering carbon dioxide to all patients after operations on the biliary tract.

For the past three years we have put all patients who have had abdominal operations on a routine procedure as follows: While still on the operating table, as soon as the peritoneum has been closed, the patient is given enough carbon dioxide by the anesthetist to take four or five deep inspirations. After the skin has been sutured the procedure is repeated. When the patient returns to bed the nurse in charge of him administers a mixture of thirty per cent. carbon dioxide and seventy per cent. oxygen for about one minute at intervals of every fifteen minutes until he is fully conscious. After this period he is closely watched to see if he is taking only very shallow respirations. If so the nurse again administers carbon dioxide at about hourly intervals. This practice is maintained for the first twenty-four hours after operation. The procedure makes it certain that the patient at frequent intervals will take two or three deep inspirations. As a matter of fact, because of the physiological action of the CO_2 on the respiratory center, he cannot avoid the deep inspirations. We feel that it is important to carry out the administration of carbon dioxide even when the patient has not been operated on under ether anesthesia because the nature of the anesthesia has very little to do with the incidence of atelectasis. We think that we have noted a very marked decline in the number of cases of pneumonia which have followed our operations on the biliary tract. It is hardly necessary to state, however, that this procedure will not prevent all cases of postoperative pneumonia. It will prevent only those which originate in an atelectasis. On the other hand, prolonged administration of carbon dioxide is not only useless but may be actually harmful, in that it will induce fatigue of the respiratory muscles, a point which has been emphasized by Van Allen and Lindskog.[11]

The plan of postoperative administration of carbon dioxide has for various reasons been carried out most satisfactorily upon patients other than gynecological ones. For that reason in the figures given below of the comparative incidence of pulmonary complications after abdominal operations in the era preceding and during the administration of carbon dioxide respectively the gynecological cases have been omitted. The reason for selecting only the abdominal cases for study is that it is well known that postoperative pulmonary complications occur with greater frequency after laparotomies than after any other type of operation. During the years 1923 and 1924 (before the era of administration of CO_2 to our patients), out of

8. Henderson, Y.: Haggard, H. W., and Coburn, R. C.: The Therapeutic Use of Carbon Dioxide After Anesthesia and Operation, Jour. A. M. A., 1920, 74, 783.

9. Coryllos, P. N., and Birnbaum, G. L.: Obstructive Massive Atelectasis of the Lung, Arch. Surg., 1928, 16, 501.

10. Coryllos, P. N., and Birnbaum, G. L.: Bronchial Obstruction: Its Relation to Atelectasis, Bronchopneumonia and Lobar Pneumonia, Ab. J. Roentgenol., 1929, 22, 401.

11. Van Allen. C. M. and Lindskog, G. E.: Obstructive Pulmonary Atelectasis, Arch. Surg., 1930, 21, 1195.

822 abdominal operations there were 19 cases of postoperative complications of various kinds, of which 6 followed upper adominal operations. The total incidence, therefore, of pulmonary complications after abdominal operations exclusive of gynecological cases was 2.3 per cent. In the year 1929 (after the plan of administering CO_2 had become well established), out of 561 laparotomies there were only 3 cases of postoperative pulmonary complications, an incidence therefore of only 0.53 per cent., or one-fourth of the previous era. It is noteworthy also that during this year there was not a single pulmonary complication recognized after an operation on the upper abdomen. On the other hand, in the year 1930, out of 496 laparatomies other than gynecological cases, there were 22 cases of pulmonary complication, an incidence of 4.4 per cent. At first glance this result would seem to indicate that the administration of CO_2 not only had been of no benefit but might even have been harmful. On closer analysis, however, one finds that 19 of the 22 cases followed operations on the lower abdomen, and these were chiefly suppurative conditions such as acute appendicitis. These facts are important because nearly all the statistical studies which have been made on the incidence of postoperative pulmonary complications have shown that they occur much more often after operations on the upper abdomen than elsewhere.[12] It is possible therefore that although the total incidence in the year 1930 was much higher than the preceding year nevertheless cases following upper abdominal operations may actually have been prevented. Those which followed suppurations in the lower abdomen, acute appendicitis, etc., were more probably embolic rather than atelectatic in origin. The administration of CO_2 can hardly be expected to prevent those cases which have their origin in infected pulmonary emboli. In the last analysis, however, these figures illustrate again how difficult it is to rely on statistics in certain types of clinical research.

Nothing has been said in these remarks concerning the special treatment of jaundice or the preparation of a patient for operation who has an obstructive lesion of the biliary tract. A discussion of these matters has been purposely omitted because the subject has been well covered by others and I have nothing particularly new to add to that field, except in so far as to indicate that much will be learned about the suitability of such patients for operation when we have more refined methods for estimating the behavior of the liver.

Two other points, however, deserve mention. One is that almost never do we operate on a patient with an acute cholecystitis. Acutely inflamed gallbladders very rarely perforate unless the inflammation occurs during an attack of typhoid fever. There is accordingly very seldom any necessity for making of such a case an emergency procedure to prevent a possible perforation. In this respect a case of acute cholecystitis is very different from one of acute appendicitis. With plenty of glucose to maintain a good storage of glycogen in the liver the patient with an acute cholecystitis may ordinarily be expected to show so marked an improvement in the course of a week or ten days that by the end of that time practically all of the evidence of the acute inflammation will have subsided except perhaps for a little residual tenderness on palpation over the gallbladder region. An operation at that time may be performed with much less risk to the patient because a good local immunity against the infection will have become established and there will consequently be less chance of the development of peritonitis following the operation.

Another point that deserves mention is that in our experience at the Barnes Hospital the mortality rate among men is about three times that among women. Other writers also have commented on the fact that apparently it is more dangerous for a man than for a woman to undergo an operation on the biliary tract. I do not know any adequate explanation of the fact.

SUMMARY

The condition of the liver is a matter of great importance in determining the operative mortality after cholecystectomy. Even in cases without jaundice and without a stone in the common duct the liver is occasionally so badly damaged and its functions are accordingly so much im-

12. See chapter by Cutler and Scott on "Postoperative Complications" in Surgical Diagnosis, edited by E. A. Graham, vol. 2, p. 181, W. B. Saunders Co., Philadelphia, 1930.

paired that it seems to be impossible for a patient to survive even a simple cholecystectomy.

Our present methods of estimating the condition of the liver are doubtless very crude in comparison with methods which will be available in the future.

The determination of the excretory function of the liver by means of such a substance as phenoltetraiodophthalein (isoiodeikon) seems to be of considerable help in gauging the suitability of a patient for operation.

The administration of adequate amounts of carbohydrate in order to insure a good reserve of glycogen in the liver will so improve the hepatic condition that a dangerous case will be converted into a safe one.

There is ordinarily a high incidence of pulmonary atelectasis after operations on the gallbladder. This can be prevented to a very great extent by the postoperative administration of carbon dioxide.

By utilizing these methods of gauging the operative mortality and of improving the condition of the patient our own hospital mortality after the operation of cholecystectomy has been reduced from 6 per cent. to 0.4 per cent.

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THE MEDICAL PROFESSION AND THE HEALTH DEPARTMENT*

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1. *Achievements of Doctors in Public Health*

The role which doctors have played in the evolution and development of our present day practice of public health is one of which the profession may well be proud.

Almost without exception the men who have brought order out of chaos and who have developed the health departments to their present state of efficiency, have been doctors. Pasteur was a chemist and many research workers who discovered facts in preventive medicine were not doctors, but it was the doctor acting as Health Officer who applied this knowledge and developed the system of wholesale preventive medicine which is the main objective of health departments. But this was all individual effort and no significant collective action in preventive medicine by organized medical societies was in evidence until the past decade. This was not the fault of the practicing physician. He had been taught curative medicine only—to care for the sick and injured and only within the past decade has preventive medicine been taught in an effective manner to undergraduate students of medicine. The evolution and development of preventive medicine in health departments since 1900 was prosecuted vigorously by health officers. Even more enthusiastically unofficial agencies by educational propaganda insisted on prevention and the development of facilities for prevention rather than cure.

The medical profession sticking to its business of curing the sick and treating the injured steadfastly refused to establish clinics for the examination of apparently healthy people or to immunize or vaccinate against disease except upon individual request. It was natural, therefore, that both official and unofficial health agencies in their enthusiasm and in the absence of such facilities, should establish clinics, and create in the public mind by education a demand for protection against contagious diseases by vaccination or immunization and for the discovery and early correction of disease and defects in the apparently healthy. Unofficial agencies were able to secure large sums of money for such preventive work—the great foundations allotted large funds for preventive work, educational and otherwise, and the official health officers secured for their departments large appropriations to prevent diphtheria, typhoid fever, tuberculosis and later venereal diseases. As a result an artificial gulf was produced between the doctor who was a health officer who practiced preventive medicine and the doctor in private practice who practiced curative medicine.

In certain diseases where treatment is necessarily a part of prevention, the doctor in private practice saw clinics develop and expand which seemed to be taking his patients away from him. This gulf should never have been created and is now disappearing. The undergraduates in Class A Medical Schools are now taught preventive medicine. Those in practice who had no such instructions are in the great majority willing to concede that preventive medicine is part of their job. They now practice preventive medicine in

*Read before Section on Public Health and Hygiene of Illinois State Medical Society, May 7, 1931, at East St. Louis.

individual cases but are slow to organize and establish the facilities (clinics) necessary to do the work on a large scale.

Forty years of evolution and development in public health work has brought public health administrators to the point where at last they know what ought to be done and the best way to do it. In those forty years, and especially in the last thirty years, they have often established both fixed and traveling clinics, conducted wholesale immunization campaigns, wholesale examination for the discovery of defects in school children—all of which is work that should be done by the practicing physician—and by the medical society as a collective unit. The only excuse for invasion of the doctor's territory was that the doctor individually and collectively would not do these things that were urgently necessary if we were to accomplish anything in preventive medicine. No health officer could sit idly by while children died, incipient tuberculosis became advanced tuberculosis, and venereal disease ran rampant when aggressive action even if wrong in principle as an invasion of the private physician's field, could prevent this unnecessary loss of life.

Public health practice is not yet standardized, but three decades of experience has taught us much. It is not longer in a state of flux. Our ideas of prevention have crystallized. Health Officers now know what ought to be done and what part organized medicine should play in the drama of preventive medicine. Even with the tremendous development in public health activity, including the clinics, immunization campaigns, drives for early discovery and correction of defects, educational propaganda and prenatal clinics for mothers, and baby welfare stations; certain fundamental defects exist in our public health programs which can only be corrected by concerted effort of county medical societies or by state medicine or some system similar to state medicine.

2. *Public Health Defects Which Can Only Be Properly Corrected by the Collective Action of Organized County Medical Societies*

(a) *Maternity and Infancy:*

While the work of health departments and unofficial agencies with educational propaganda and by clinics has reduced the infant mortality very considerably, the death rate for mothers in childbirth or soon after and of children under one month of age remains high. It is so high that it places the United States near the bottom of the list of civilized nations and really constitutes a national disgrace. No amount of money expended, as, for instance, under the Sheppard-Towner Act, can have much effect upon this high death rate. It is due to our lack of proper prenatal and obstetric care by doctors who have not had sufficient experience before graduation, who have no lying-in hospital available and the enormous number of ignorant, untrained or partially trained midwives. It is not the midwives alone who are to blame. There are too many busy general practitioners who do obstetric work, who did not have the undergraduate training and experience necessary, and who lack the advantage of expert consultant advice that could be made available in a lying-in hospital and clinic established and supervised by the county medical society.

(b) *The Pre-School Child:*

The greatest single defect in our public health work today is our inability to secure early immunization and discovery and correction of defects in children from one to five years old. In this field health officers have barely scratched the surface. We begin to get control of children only in the school age group—and here five years have been lost. Strenuous efforts have been made through baby welfare stations, parent-teacher associations and the splendid missionary work of public health nurses, but the fact remains that in the main this field is almost untilled. The only way in which early immunization and discovery and early correction of defects can be secured is by the action of the practicing physicians individually and collectively. Official action cannot reach this group.

(c) *Preventive Medicine for the Adolescent and Adult.*

Most certainly we need more general practitioners but we need general practitioners who have knowledge of the modern technique and equipment necessary for early diagnosis in the ambulant stage. It is too much to expect that they should have this equipment in their individual offices but the equipment and apparatus should be readily available, within easy reach and freely used. Too often we find plain symptoms of gastric or duodenal ulcer treated for

months by prescription for indigestion; incipient tuberculosis treated by prescription for months without diagnosis until it becomes moderately or far advanced; pathologic conditions of gall bladder or appendix without a Graham test or x-ray treated for months by prescription until some acute climax forces operation or causes sudden death; hyperthyroidism and hypothyroidism receiving perfunctory office treatment by prescription without basal metabolism tests; treatment of female genital complaints by tampons or by guess-work surgery without x-ray after the use of dyes, and many other conditions which receive office treatment without using modern diagnostic methods.

In the large cities and medical centers the diagnostic equipment is available and more likely to be used. The general practitioner of fifty or more years of age is more likely to have kept pace with the advances in diagnostic technique. In the small cities and towns and in the large rural areas where the average age of physicians is fifty-two years, it is quite another story. If a man or woman not acutely ill asks for examination or treatment the examination is perfunctory and incomplete. The campaign and propaganda for annual physical examinations of the apparently healthy fell far short of its possibilities because in cities the examination cost too much or the applicant feared an unknown cost. In the small cities and towns and rural areas it was a failure because the facilities for complete examination did not exist.

3. *Factors in the Failure of Organized Medicine to Correct These Defects*

(a) *Lack of Organization:*

We speak of the organized medical profession but its organization is little more than provision for periodic meetings for the reading and discussion of papers on scientific subjects. An exaggerated sense of ethics makes the doctor shrink from anything like business organization, yet organization on a business basis, provision of clinic facilities, regulation of fees on a sliding scale basis according to income is essential if state medicine is to be prevented. There are notable exceptions—The Kings County (Brooklyn); The New York Academy of Medicine; The Wayne County (Detroit) Medical Societies have taken steps toward business organization along lines of social service, but except these and a few others in large cities, county medical societies are unorganized except for periodic meetings for presentation and discussion of scientific papers. The business side of their real obligation, to establish facilities for the best preventive medical and surgical advice and treatment at a price that each citizen can afford is entirely neglected.

(b) *Cost of Medical Care:*

There has been a lot of loose talk and inaccurate statement in regard to the cost of medical care. The best modern medical care is worth all that you pay for it, provided you can afford the cost. The cost has not increased out of proportion to the increased cost of other services. Medical care, especially early diagnostic procedures and treatment, has been expanded and amplified by the discovery of more precise methods of diagnosis and has become exceedingly complex. This necessarily adds to the cost over the examination of forty years ago in which the doctor used only his own senses and perhaps a stethoscope.

In the large cities the facilities for early diagnosis and the best preventive medical and surgical care are available. The trouble here is that the man of moderate means does not know what it will cost, and fearing that the cost will be excessive he avoids the doctor and the clinic, and neglects himself and his family until serious illness or injury forces him to call a doctor. In the small cities, towns and rural areas, lack of proper early preventive treatment is not due to the cost, but is due to the fact that the facilities for early diagnosis and treatment do not exist. I have seen many small cities with a small modern hospital approved by the American College of Surgeons but without an out-patient department. What does this mean? There is no provision for preventive medicine, a man must be knocked down by an automobile, have typhoid fever or pneumonia, in other words be seriously injured or acutely ill before he comes in contact with the modern equipment of such a hospital. There must be a decentralization of modern equipment from the large cities and medical centers to the small cities and towns, and also a better distribution of young doctors who know how to use this equipment.

(c) *Distribution of Doctors:*

While the problem in large cities is largely one of organization and adjustment of modern fa-

cilities which already exist, the small city, town and rural problem is the necessity for these facilities which do not now exist. Next to the need for out-patient facilities and modernly equipped clinics, the greatest need is more and better trained doctors. One-third of the towns of 1,000 population or less in 1925 had no doctors. In 1906 there were 33,000 doctors in such small towns, in 1924 there were 27,000, or a decrease of 18%. The average age of these doctors in 1925 was 52 years. When these men were graduated, preventive medicine was not taught nor was it considered a part of a practicing physicians work. Present day methods of precision in diagnostic technique and modern equipment were unknown.

It is possible that doctors in this age group in the large cities have kept pace with advances in methods and apparatus for modern practice, but in the small city, town or rural area it is extremely unlikely that doctors over 50 have kept up, and even if they have a reading knowledge of such methods and equipment, the facilities are not available.

The young medical graduate of a Class A school today is trained in preventive medicine, and is taught to use these modern instruments of precision in diagnosis. He learns to depend upon the modern facilities which are used in his college and hospital training. These are available in the city and hence he stays in the large city. He will not go to the small town because these facilities do not exist and he cannot practice medicine in the way he has been taught. Here again the remedy is obvious, there must be decentralization of modern diagnostic and treatment facilities from the large cities and medical centers to the small city.

In the distribution of young, highly trained graduates, the law of supply and demand is inoperative. Why? The reasons given above explain. The young doctor would go to the small city or town where the demand for his services is greater, and the remuneration also greater than in the keen competition of the city overcrowded with doctors, provided he could practice medicine in the modern way with modern facilities, which he considers indispensable.

4. *Remedies Suggested for Correction of These Defects.*

(a) Organization of County Medical Societies, and decentralization of Modern Methods, Technique and Equipment for Early Diagnosis and Treatment.

It is not sufficient to have all facilities for the best preventive medical and surgical diagnosis advice and treatment available in the large city or medical centers of a state. The citizens living in small cities, in towns or rural areas are, in common justice, entitled to the use of such facilities quite as much as the wealthy or the poor living in the great city or medical center. The county medical society should establish or cause to be established in the county seat and in populous counties in other small cities, out-patient clinics completely equipped for early diagnosis and treatment. They should fix the fees on a sliding scale according to income—for example dividing the clientele into three or more classes:

(1) The indigent to be paid for by the county at a fixed rate.

(2) Those earning less than $1500 per annum to pay a minimum fee.

(3) Those earning from $1600 to $2400 per annum to pay a higher fee.

(4) Those earning over $2400 per annum to pay full fees.

They should fix the fees for house or office visits for these same classes. The facilities for diagnosis or treatment of the out-patient clinic or hospital should be available for all members of the medical society, and the fees collected divided pro rata.

(b) *State Medicine:*

I use the term state medicine because it is in common use for the bogey that continually confronts the practicing doctor. State medicine means the assumption by the Government (federal, state or municipal) of the obligation to give every citizen or certain groups of citizens medical and surgical care, by doctors who receive no fees but are paid a salary by the Government. In general this would mean the State Government, but the same results to the practicing physician are possible by the encroachments of private corporations who assume this obligation for their employees, using salaried physicians to do the work.

The advocates of State medicine have claimed

that the defects noted above in our public health activity would be corrected by State medicine because medical and surgical and presumably preventive advice and treatment would be available to all citizens without cost. One must admit that theoretically under such a system treatment would be available to all, but what kind of treatment? If a crowded office in which the panel doctor gives a prescription, rushes one patient out and like a barber calls "Next" can satisfy the needs of scientific medicine, then the system might suffice. But today the average American citizen knows he is entitled to better treatment than this. He has been educated to the point where he knows something of the newer methods and equipment used in modern diagnostics and treatment.

To me state medicine appears a miserable makeshift. It is un-American, ultra-paternalistic and destructive of self respect in both doctor and patient. It is a failure in Germany, in England and in other European countries. It is from an American viewpoint a pauperizing influence, wrong in principle and doomed to failure in practice, if we are ever foolish enough to try it.

In presenting this paper I had in mind two objectives, the first concerns the practicing physician, the second public health administration. I want to see the medical profession solve its own problem in its own way without outside interference by governmental or any other agency. Proper organization of county medical societies will make state medicine impossible, enable the doctor to retain his self respect and preserve that priceless, intimate, confidential relation that should exist between doctor and patient. In regard to the second objective, more efficient public health administration, this same organization of county medical societies will also correct the defects in our public health activity cited above. It will make possible better lying-in facilities and better consultant advice for prenatal work. It will provide the machinery now lacking for early diagnosis and treatment of diseases or defects in the pre school child, and in adolescents and adults as well.

DISCUSSION

Dr. Chas. H. Miller, Chicago: The paper is depressing to me because I fully agree that the difficulties that confront the medical profession individually or collectively are almost insurmountable. If I read the times right, we are headed for State medicine. Why do I think so? After an experience of thirty odd years, I realize the shortcomings of physicians and I appreciate the value of a centrally administered department of health. I don't know why I should take the time but I can't help it. In Chicago, knowing that it was possible to abolish diphtheria with toxin-antitoxin administration, with the Health Commissioner wholly cooperating, we proposed to immunize the children in Chicago against diphtheria. We had the facilities and the financial support of the Department of Health. We had the tentative, full cooperation of the Chicago Medical Society, and where did we get? We sent out requests for cooperation on the part of the physicians in the city and there was abundance of cooperation, absolutely all that anybody could ask. Where did we get in getting these children immunized? We got a paltry twenty-five or thirty thousand and at that we certainly fared better than a great many of the larger cities. It wouldn't work. It didn't work, and it didn't work until Dr. Kegel said, "I will have to use the health organization of the school system to get the children immunized. Many parents wouldn't bring them in. We had six hundred thousand full page advertisements donated by one of the dailies in which the benefits of immunization were proclaimed and every child in the school got one of them to take home and notwithstanding that we immunized but a paltry number, until Dr. Kegel put the health nurses and health physicians behind the scheme, with a willingness to immunize every child that would be permitted to have it done by the parents, with the result that the number immunized jumped right up.

Preventive medicine will never be carried out by the physicians. Why? They are too busy. They haven't got the time. A large number of them are not sufficiently educated along those lines. They are not sufficiently interested. But the combined reasons are adequate to prevent the successful prevention of illness.

I was very much interested in what Dr. McLaughlin had to say about the organization of the county medical societies in a group to organize clinics providing facilities for recognizing incipient diseases and all that. I have no experience in local practice, but it seems to me that it is more probable to get State medicine than it is to organize our profession in a group way that will provide the necessary equipment and cooperative effort that will yield adequate results. State medicine is going to prostitute the medical profession to the point that will put it back a hundred years so far as the attention the individual will get is concerned. When a man will change his physician, as they do in England, to one who will certify that he is unable to work long weeks after he is, and if the physician is unwilling to do so, he changes his doctor. Such organization is absolutely incompatible with all business or with any other form of logic, but as there are so many individuals and organizations interested in that phase of the problem it will require all the influence that the medical profession of the United States has to

prevent its coming, because on the other hand, as I have stated, there is so much that can be done by capable public health cooperation in the prevention of the incidence of disease which can not be well done apparently by individual effort.

Dr. McLaughlin: May I be permitted to say a word. I take it your remarks were in a measure a discussion. When you said State medicine was almost inevitable, it was the easiest way, I couldn't agree with you. I told you I wasn't as much of an optimist as I was fifteen years ago, but I am not a quitter. I will keep right on in the line I think is right and I know is right. You said it was the easiest way. So, too, if a man falls off a bridge into the water. The easiest thing is for him to drown, but, if he is a man of courage, a man of purpose, he will strike out for the shore and probably save himself.

Dr. D. D. Monroe, Edwardsville: Individualistic tendencies that are characteristic of all physicians are carried over into the State Medical Society. At this annual meeting, I see a Section on Hygiene, one on Medicine, one on Surgery, and one on Eye, Ear, Nose and Throat. Yesterday in the Section on Medicine I heard a brilliant paper on renal disease. Those in the other sections missed it. This morning Dr. McLaughlin gives us a wonderful paper on state medicine. Nobody hears it except this section, who do not need to be converted. We are doing all of our medical society work in sections and we are not getting any place because we do not get together in large groups. We are interested in surgery or in our own specialty if we have any. We ought, however, to get together in large groups once a year and forget our individualistic tendencies. We might well begin by breaking up some of our section meetings and having more general meetings. We have had a number of good papers in the General Session and I see no reason why Dr. McLaughlin's paper could not have been heard there.

Dr. McLaughlin, in closing: I want to thank the gentleman. I think that is the most sensible talk I have heard from a member in the last five years. Let's have our meetings, let's be interested in our Eye, Ear, Nose and Throat meetings, and others. Meetings are for the purpose of presentation and consideration of scientific papers. Go on with them, but, above all, let's have some general meetings for the medical profession as a whole. The problem that confronts it, confronts it as a whole and it is a problem that it alone must meet as an organization if it wants to avoid State medicine.

I don't want you to misunderstand me and I am sure Dr. Miller did. What I said was directly about what the physician ought to do to cover up some of the gaps in public health work that are now uncovered. He evidently got the impression that I wanted to minimize the work of the health department. I am a health officer. I said I was a doctor first of all; that's true; but after all I have been every kind of health officer there is, a State health officer, city health officer, and federal health officer for thirty years, and I know the necessity perhaps as well as anybody of public health departments perfectly organized and adequately staffed. But I don't want them to do the kind of work that can be done by the private practicing physician, and I don't think any other health officer does, but they only do it because they can't get it done in any other way. I am not substituting the greater activity and greater organization of the medical profession for health departments; not by any means. I want to go ahead and progress together but I want the medical profession to achieve its manifest destiny, solve its problems and kill forever this bogey of State medicine.

Dr. Miller: Just a minute. I fear that my remarks have made a wrong impression. I am just in the same frame of mind as you, desirous of having the medical men solve and work out their own problems and postpone if possible the evil day of State medicine, but I can't help but believe that there is a possibility that we will never do it.

Dr. McLaughlin: Well, if you can't visualize success you will never achieve it.

Dr. Miller: Because of the superior results obtained by public health organizations, I believe that it will be necessary to divide the problem between them and continue to do so just as we have been doing.

Dr. McLaughlin: I am sorry I can't agree with you.

TULAREMIA*†

A Summary of Recent Investigations and a Consideration of the Dayton Experience with Eighty-eight Cases

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The past decade has brought remarkable advances in medical knowledge. Among the most striking developments has been the establishment of tularemia and undulant fever as important nosological entities. The abruptness with which these diseases have been brought to the foreground of clinical medicine, particularly in this country, leads one to a thoughtful consideration of the probability that there are many other distinct clinical entities yet to be recognized in that large group of obscure febrile diseases, variously designated by such general names as influenza, intestinal infection, la grippe, septicemia, pneumonia, et cetera.

Tularemia probably occupies a unique position in medical history because of the rapidity with which it has evolved from the obscurity of a clinical curiosity to the prominence of an important public health problem. Tularemia is likewise historically unique in that the develop-

*From the Diagnostic Laboratories of the Miami Valley Hospital, Dayton, Ohio.
†Presented at Joint Meeting of the Illinois State Medical Society, East St. Louis, May 5, 1931.

ment of our knowledge of the disease is entirely due to the labors of American investigators.

Six years ago tularemia was practically an unknown name in medical literature; reports of but fifteen cases had appeared up to that time. Since then, thanks to the diligent efforts of a few investigators, notably Edward Francis, the name has become a commonplace. Tularemia has now been recognized in every state of the Union except Maine, New Hampshire, Vermont, Connecticut and Delaware.

Descriptions of the disease have appeared in the medical literature of every civilized nation. Whereas, a short time ago, tularemia was generally believed to be of importance only in a few of the northwestern states of this country, it is now known that the disease is world-wide in its distribution. The disease independently described by Ohara in Japan is now known to be tularemia.[1] Laboratory workers have acquired the disease in England.[2] During 1928 and 1929, over 1,000 cases were recognized in the Union of Socialistic Soviet Republics.[3] Four Russian workers paid the apparently inevitable toll for their investigations; all acquired tularemia in the laboratory; this brings the total number of laboratory infections to 24.

More recent reports by Thjøtta[4] tell of his recognition of 50 cases of tularemia in Norway; Thjøtta has also accumulated evidence which demonstrates that the disease is by no means a new one in Norway. Reports of the recognition of the disease in other countries, in which it undoubtedly exists, are eagerly awaited by students of tularemia.

The reports of the Russian cases introduced a new animal source of infection—the water-rat or water-vole of Europe (*Arvicola amphibius*), which is hunted for its valuable fur. While wild rabbits constitute the most important reservoir of infection for other animals and man, new animal hosts and insect vectors have been discovered. These observations are of the greatest practical importance because they indicate the ever-widening spread of the infection to other forms of animal and insect life, a situation which is almost certain to be reflected in an increase in the incidence of the disease among human beings. The disease has been found to exist in nature among wild rats and meadow mice (*Microtus californicus aestuarinus*), in California.[5, 6] The writer[7] has recently reported a case of oculoglandular tularemia in a man resulting from contact with a woodchuck (*Marmota flaviventer;* ground hog). Recent reports[8, 9, 10] have attributed the development of tularemia in human beings to the skinning of opposums (*Didelphis virginiana*), muskrats (*Ondatra zibethica*) and the fox squirrel.

While McCoy and Chapin[11] were engaged in their investigations of the "plague-like disease of rodents" in California in 1911, they attempted to infect five sheep (*Ovis aries*) with subcutaneous injections of saline emulsions of spleen, liver and other tissues from guinea pigs which had died of *Bacterium tularense* infection. Three of the sheep were infected; two died. Francis[12] injected a sheep with a pure culture of *Bacterium tularense;* the animal died of the disease on the twenty-third day after the inoculation. In the spring of 1923, Parker, of the Public Health Service Laboratory at Hamilton, Montana, learned of several instances of heavy losses among sheep in eastern Montana and southern Idaho. The affected sheep were known to be heavily infested with the wood tick (*Dermacentor andersoni* Stiles). A few months after these discoveries, Parker, Spencer and Francis[13] demonstrated that the wood tick was a common host and transmitter of tularemia. The belief of Parker and Francis that the wood ticks had infected the sheep with tularemia was supported by the recovery of *Bacterium tularense* from the spleens of guinea pigs which had been injected with ticks removed from sick sheep and by the reproduction of the disease in guinea pigs inoculated with tissues from the same sheep. In view of the fact that wood ticks which have fed on rabbits infected with tularemia are capable of harboring the organism throughout the winter and infecting other animals in the spring, it seems possible that the spread of the disease among sheep in tick-infested areas may assume considerable economic importance. Of even greater importance is the possibility of human infection from the handling of infected carcasses, or from the contamination of the hands with the tissues of crushed infected ticks or with tick excrement, while shearing or skinning sheep. Geiger and Meyer,[14] in their recent report of the widespread occurrence of tularemia in Nevada, state that the source of human infection

in two cases was direct contact with the tissues or hides of sheep.

The development of typical ulceroglandular tularemia in a man who had been bitten on the hand by a coyote pup (*Canis lestes*) stimulated Parker,[15] in 1926, to investigate the susceptibility of coyotes to tularemia. Three young coyotes were fed with the tissues of guinea pigs and Belgian rabbits just dead of tularemia. The coyotes died 13, 22 and 53 days, respectively, after the infectious material was first given. Typical acute tularemia infection was produced in guinea pigs injected with emulsions of tissue of the dead coyotes and the organism was recovered. The presence of the infection in the salivary glands of two of the coyotes introduced the possibility of a new avenue for the transfer of the infection to man by the bite of a wild rodent or carnivore. A more recent report (February, 1930) by Kunkel[16] tells of the development of ulceroglandular tularemia in a man who contaminated a fresh cut on a finger while disposing of the carcass of an adult coyote which he had killed.

Domestic cats and kittens (*Felis catus*) inoculated by McCoy and Chapin[17] and Wherry[18] with tissues of infected guinea pigs and cultures of *Bacterium tularense* did not acquire the disease. These findings led these investigators to assume that the domestic cat is naturally immune to the disease. Because they were led to suspect that the domestic cat may have been a contact carrier or a naturally infected transmitter of the disease in two cases of tularemia occurring in human beings in Minnesota, Green and Wade[19] fed infected guinea pig tissues to two cats. One cat died six days after eating the liver of a guinea pig dead of tularemia; the injection of the cat's tissues into guinea pigs resulted in their death from tularemia. The other cat was sacrificed on the eighteenth day; a guinea pig inoculated with the cat's splenic tissue died of tularemia. By feeding infective material or by injections of heavy suspensions of pure cultures of *Bacterium tularense* to six cats and seven kittens, Francis[20] succeeded in reproducing the disease in two kittens; the remaining eleven animals were entirely unaffected. From these studies it seems reasonable to conclude that the domestic cat is but mildly susceptible to the disease.

The writer[21] inoculated on the same day two dogs, two guinea pigs and two Belgian hares with virulent cultures of *Bacterium tularense* recently recovered from the blood of a human being who had died four days and seven hours after the onset of illness. The two guinea pigs died in four days, with the characteristic gross and microscopic manifestations of tularemia and the organism was recovered in pure culture. One of the Belgian hares died on the seventh day after inoculation; the other died on the eighth day. Postmorten examination revealed the characteristic lesions of tularemia and the organism was recovered. The two dogs remained entirely well for two months, at the end of which time they were sacrificed. Complete autopsies failed to reveal the characteristic pathologic anatomy of tularemia; serologic and bacteriologic studies were entirely negative. The dog appears to possess a natural immunity to the disease.

The horse, cow, hog, fox, pigeon, domestic chicken and turkey do not appear to be susceptible to either natural or experimental infection with *Bacterium tularense*.

For many years, trappers and hunters in many regions have observed that decimation of wild rabbits and certain game birds occurred during the same season. In 1925, Parker and Spencer[22] pointed out that the common rabbit tick (*Haemaphysalis leporis-palustris*) which was known to be an important rabbit-to-rabbit transmitter of tularemia, was also found on game birds. These two workers succeeded in experimentally infecting the blue grouse of Montana with tularemia. Green and Wade [23] have found that the ruffed grouse and the Hungarian partridge possess a high degree of susceptibility to experimentally induced *Bacterium tularense* infection.

Early in 1929, Parker[24] described the experimental production of tularemia in quail. Later in the year, Green and Wade[25] reported the natural occurrence of tularemia in quail. While it appears probable that many game birds are at least potential agents of human infection with tularemia, no proved case of such origin has yet been described. The histories of two cases of tularemia in human beings suggest that contact with quail may have been a source of infection.[26]

Deer flies (*Chrysops discalis* Williston) and wood ticks (*Dermacentor andersoni* Stiles) are important animal-to-animal and animal-to-man transmitters of the disease in the northwestern states. The development of many cases of tick-

borne tularemia in the southern states, where *Dermacentor andersoni* is not found, introduces the probability that the infecting ticks are either *Dermacentor variabilis* or *Amblyomma americanum*, common man-biting, three-host ticks of that region. A recent report by Parker, Brooks and Marsh[27] tells of the occurrence of *Bacterium tularense* in the wood tick, *Dermacentor occidentalis* Newmann, collected from tick-infested cattle in San Benito County, California.

This rapid succession of recent reports of new animal hosts and insect vectors brings a realization of the probable perpetuation of the disease and of the numerous avenues for human infection.

The discovery of tularemia in Indians in Nevada[28] and Washington[29] eliminates the tradition that Indians possess a natural immunity to the disease.

SUMMARY OF DAYTON EXPERIENCE

On November 25, 1927, a twenty-five year old negro was admitted to the emergency ward of the Miami Valley Hospital. His temperature on admission was 106° F. He was in delirium and was quite unable to give any account of his illness. From his wife it was learned that he had been employed at a local wholesale market, where he had skinned and dressed several hundred cottontail rabbits during the week preceding the onset of illness. His illness commenced on November 22, when he complained of a severe headache on arising. Later in the day he experienced a severe chill which was followed by a rapid rise in temperature and repeated chills and sweats; painful masses appeared in the right axilla and epitrochlear region during the same day. The suggestive occupational history and physical findings led to a presumptive clinical diagnosis of tularemia.

Ten cubic centimeters of blood were withdrawn from an arm vein. One cubic centimeter was immediately injected into each of two guinea pigs. The remainder was sent to Francis, at the Hygienic Laboratory at Washington, D. C.

The patient died on November 26, four days and seven hours after the onset of his illness. A detailed description of the autopsy findings has been published.[30] Because of the fact that this is the most rapidly fatal case of tularemia in man on record, an unusual opportunity was afforded to study the early gross and microscopic manifestations of the disease. The subcapsular surface of the moderately enlarged spleen (165 grams) was found to be studded with multiple grayish-white areas, usually spherical but sometimes irregular, varying in size from that of a common pinhead to that of a small pea. Similar areas were found scattered haphazardly throughout the splenic pulp. The liver was of normal size; careful scrutiny failed to reveal any whitish areas such as were found in the spleen. Three right epitrochlear lymphnodes were of kidney-bean size. The right axillary lymphnodes were greatly enlarged, varying in size from that of a large pea to that of a plum. The nodes were soft and friable and showed many small grayish-white areas of caseous necrosis on section. There were multiple fissures and extensive desquamation of the epidermis of both hands, most marked on the right; there was no distinct ulcer. (The patient had kept his hands more or less constantly immersed in hot water at his work). The rectus abdominis muscles showed an extreme degree of Zenker's necrosis.

Microscopically, the whitish foci in the spleen and lymphnodes were seen to be areas of early caseous necrosis. Surrounding most of the miliary and submiliary necrotic areas was a narrow zone of avascular epithelioid and fibroblastic proliferation, devoid of giant cells of the Langhans' type. Many of the smaller foci of necrosis showed no peripheral granulation tissue reaction; such areas were identical with the acute necroses observed in rodents which had died acutely of tularemia. The normal architecture of the spleen and lymphnodes was largely destroyed. There was marked reticulo-endothelial hyperplasia.

Two localized areas of caseous necrosis in the parenchyma of the right lung showed essentially the same changes as were observed in the spleen and lymphnodes; this finding leads the writer to suspect that in those fatal cases in which the physical signs of bronchopneumonia have been found, the lesions are actually hematogenous focal manifestations in the lungs. It would be erroneous to consider such foci as areas of bronchopneumonia.

While the gross examination of the liver revealed no whitish areas, microscopic sections showed tiny submiliary lesions of simple necrosis, associated with reticulo-endothelial hyperplasia. The early hepatic lesions showed a striking absence of caseous necrosis. The lesions of tularemia should, therefore, be grouped with the infective granulomas.

Immediately following the autopsy, two guinea pigs were inoculated with a saline suspension of right axillary lymphnode tissue. The guinea pigs which had been inoculated with the patient's blood on the previous day died four days later. The guinea pigs which were inoculated with the axillary lymphnode tissue died the following day. All of the animals showed the "spotted spleen and liver" and the enlarged caseous lymphnodes typical of tularemia. From the heart's blood and splenic tissue of the dead guinea pigs, *Bacterium tularense* was recovered in pure culture upon our human serum modification of Francis' cystine agar.

The organisms thus recovered were then passed through four series of guinea pigs with three guinea pigs in each series and the organism was successfully recovered in each instance. After the growth was abundant on the artificial culture media the organisms were taken off in 0.2 per cent formalin and used as antigen for agglutination against known anti*tularense* serum. In each instance the organism agglutinated promptly to the full titer of the known serum (1:1280).

Bacterium tularense was likewise recovered in pure

culture by Francis from the serum which was submitted to him on the day before the patient's death.

The hair was shaved from the abdomen of four healthy guinea pigs, and the abraded skin was rubbed gently with fragments of splenic tissue from animals recently dead of tularemia. Three of the guinea pigs died within four days, and one succumbed on the fifth day. The autopsy revealed the characteristic gross lesions, and in each instance the organism was recovered from the heart's blood or splenic tissue of the dead animal. This experiment constituted a reproduction of the ulceroglandular type of the disease.

In order to determine whether or not the organisms thus recovered would penetrate unbroken skin, fragments of splenic tissue were rubbed gently on the unshaven, unabraded intact skin of the abdomen of four guinea pigs. Two of the animals died, one on the fifth day and one on the sixth day, with the characteristic gross and microscopic lesions; the organism was recovered from both. This experiment corresponds to the glandular type of the disease as it occurs in man.

Tiny fragments of splenic tissue removed from animals recently dead of tularemia were placed in the right conjunctival sac of two healthy guinea pigs. On the following day both animals showed excessive lacrimation. On the third day a grayish-white thin film developed over the bulbar conjunctiva, with marked capillary injection and multiple minute papules of both the bulbar and the palpebral conjunctivae. Both animals died on the fifth day with caseous regional lymphnodes and the characteristic spotted spleen and liver, and from both animals the organism was successfully recovered. The oculoglandular form of the disease was thus reproduced.

Because of the fact that 24 skilled laboratorians have acquired tularemia during the course of their investigations as the result of making postmortem examinations on infected animals or as the result of handling infected wood ticks, unusual precautions were employed throughout all of the experimental work. The dead animals were immersed in 10 per cent solution of formaldehyde for five minutes before each autopsy. Sterile gowns, sterile gloves, gauze masks and glasses were worn by the prosector. All tissues were handled with sterile instruments. All of the materials used were sterilized immediately after the autopsy, and the benches on which the work had been carried out were washed off with 10 per cent solution of formaldehyde and running water. The prosector's hands were washed with soap and water, then immersed in 10 per cent solution of formaldehyde for a few minutes and then held under running water. The cages in which the animals died were immersed in boiling water. In order to limit the possibilities for the development of the infecion, all of the experimental work was carried out by the writer. No person in the laboratory contracted the disease.

In view of the fact that the diagnosis of tularemia was established in the case of the young negro who died four days and seven hours after the beginning of illness, it occurred to the writer to carry out an investigation in the market at which he had worked. Eight rabbit handlers at this market were found to be acutely ill at home or in hospitals and in each instance the diagnosis of tularemia was established by positive serologic reactions. During the month of November, 1927, the writer saw twenty-four persons acutely ill with tularemia.

It has been repeatedly stated that it has been impossible to recover the *Bacterium tularense* on artificial culture mediums directly from human tissues. The writer succeeded for the first time in recovering the organism on a human serum modification of Francis' cystine agar from material taken from the involved axillary lymphnodes of two patients suffering from the acute manifestations of the disease. More recently, Shaw and Hunnicutt[31] have also reported the direct isolation of *Bacterium tularense* from axillary abscesses. It should be stated, however, that the likelihood of recovery of the organism is much greater if the material from the primary lesion or affected lymphnodes is injected into guinea pigs; cultures are then made from the guinea pig's spleen, lymphnodes, liver and heart's blood.

The discovery of such a large number of cases in one month stimulated the writer to investigate the prevalence of the disease in Dayton prior to 1927. In conversation with several Dayton physicians the writer learned of many patients who had experienced illnesses, the nature of which was obscure at the time, but which these physicians now believed to have been tularemia. The writer visited these individuals and in practically every case elicited a characteristic history of tularemia and found serum agglutinins still present. Each of the larger markets of the city was then visited. In each of these markets at least one meat handler had had tularemia at some time during the previous 20 years. The market men of Dayton were thoroughly familiar with the disease and have known of its existence in this region for at least 30 years. They have called the disease "rabbit

fever" or "rabbit disease." Experience had taught them to dread the "rabbit season" because of the certainty with which one or more of the meat handlers would acquire a prostrating illness and often be incapacitated for months. Observations over this long period had taught them that a meat handler who once acquired the disease was free from danger of further infection. As a result of these investigations, 29 confirmed cases of tularemia which had occurred prior to 1927, were discovered.

In November, 1928, four additional Dayton cases were reported,[32] bringing the total of the Dayton cases encountered during one year to 53. These investigations revealed that tularemia was a common disease in this region. Furthermore, it was conclusively demonstrated that the disease had been prevalent in Dayton for at least 20 years, during which time 7 deaths, attributable directly to tularemia, had occurred. Eleven additional cases were described in January, 1930;[33] sixteen new cases were encountered during the fall of 1930, bringing the total number of cases to 88. This represents by far the largest number of cases to be reported from such a circumscribed area.

One purpose of the present undertaking is to report for the first time the 8 cases of tularemia which were encountered in or near Dayton during the autumn of 1929. The pertinent clinical and serologic findings in these cases follow:

Case 1. Mrs. F. L., patient of Doctor J. C. Ryder, acquired an abrasion of the skin of the right index finger while dressing wild cottontail rabbits on December 7, 1929. Mrs. L. wore rubber gloves during the first part of the cleaning operation but discarded them after one of the glove fingers became torn. Two days later she experienced repeated chills with a rapid elevation of temperature to 103° F., accompanied by headache, backache, muscle and joint pains. On December 10, Mrs. L. noticed for the first time a painful mass in the right axilla; within 3 days this mass had reached the size of an orange. The right epitrochlear lymphnodes became enlarged to the size of an acorn. Mrs. L. remained bedfast for 4 weeks with recurring chills and sweats. She lost considerable weight during this time. She was unable to resume her household duties until the first week of February, 1930. On April 1, 1930, the axillary mass showed definite evidence of fluctuation and was incised by a Cincinnati physician. Several ounces of thick yellowish purulent material escaped.

The serum of Mrs. L. submitted to me on April 30, 1930, by Doctor Ryder, who had seen the patient for the first time a few days previously, was found to agglutinate *Bacterium tularense* in all dilutions to 1:320.

On June 1, 1930, Mrs. L. stated that she had not regained her former weight and strength.

Case 2. Mr. H. W. S., patient of Doctor Paul W. Tappan, a 40-year-old factory worker, hunted rabbits in Brown County, Ohio, on Saturday, November 23, 1929. He killed 5 rabbits during the day. He wore rubber gloves when he cleaned them but contaminated his hands with fresh rabbit tissues after he had completed the cleaning of the rabbits. Three days before the hunting trip, Mr. S. cut the skin of the right thumb overlying the dorsal surface of the metacarpophalangeal articulation. A pea-size papule appeared at the site of this cut 5 days after the hunting expedition. The next day the center of the papule became necrotic and was liberated and left a "punched-out" ulcer about 1 cm. in diameter. The next day he experienced a chill and a fever which reached 103° F. He was certain that he had acquired influenza, because of the chills, fever, headache, backache, joint pains and marked prostration. He remained in bed for 6 days. A painful walnut-size mass which developed in the right axilla was not noticed until December 2. Mr. S. lost 12 pounds in weight during the first week of his illness. The axillary mass did not suppurate and gradually diminished in size during the following month. Mr. S. was unable to continue his work until the first week in January.

Serum of Mr. S. was found to agglutinate *Bacterium tularense* in all dilutions to 1:1280. Specimens submitted to Doctor Francis at the Hygienic Laboratory at Washington, D. C., and to Leo Ey at the Ohio Department of Health Laboratories at Columbus, gave similar results.

When seen by the writer on August 7, 1930, Mr. S. had entirely recovered his previous good health.

Case 3. Mr. J. S. D., patient of Doctor O. H. Stuhlman, a 27-year-old mechanic, killed and dressed one wild cottontail rabbit on November 23, 1929. During the course of the hunt Mr. D. scratched his hands several times with briars. On November 26, he first noticed painful enlargement of the left axillary lymphnodes. Two days later he experienced a sharp chill and a rapid elevation of temperature, associated with severe headache and general aching sensations in the back and extremities. No distinct ulcer appeared on the hand. Mr. D. continued to experience chills and fever for 3 weeks.

A blood specimen collected on the thirteenth day of illness showed no agglutination with *Bacterium tularense* antigen. A second specimen collected 26 days after the onset of illness showed agglutination in all dilutions to 1:320. Similar results were obtained by Doctor Francis.

Case 4. Mr. E. H., patient of Doctor F. C. Rounds, a 40-year-old factory worker, killed and dressed about 100 rabbits in the woods near Hillsboro, Kentucky, on December 3, 4 and 5, 1929. Mr. H. was aware of the anatomical characteristics of tularemia as they appear in the rabbit and examined all of them carefully for the presence of spotted spleens and livers. He encountered one rabbit wihch he is sure had the disease.

On December 9, Mr. H. experienced a severe chill and a fever of 103.4° F., accompanied by severe headache, backache and drenching sweats. On December 10, he noticed for the first time a painful lemon-size mass in the left axilla and two small papules in the skin overlying the dorsal surface of the distal phalanges of the third and fourth left fingers. Both papules had necrotic cores which were liberated within the next 2 days and left sharply defined ulcers, each about 1 cm. in diameter. Over the flexor surface of the left forearm and along the inner bicipital groove of the arm multiple sporotrichosis-like firm nodules appeared, varying in size from pea to cherry. When seen by the writer, 9 days after the onset of illness, Mr. H. had lost 20 pounds in weight. His fever persisted for 3 weeks.

Serum of Mr. H., collected 9 days after the onset of illness, showed no anti*tularence* agglutinins. A second specimen, collected 27 days after the onset of illness, showed strongly positive agglutination of *Bacterium tularense* in all dilutions to 1:1280.

Case 5. Mrs. A. B., a 33-year-old negress, purchased one wild cottontail rabbit at a Dayton market on November 26, 1929. She prepared this rabbit for cooking in her home. On December 2, a pea-size papule developed on the skin of the pad of the left thumb. At the same time she experienced a painful sensation in the left axilla and discovered there 2 cherry-size lymphnodes. Within a few hours of the discovery of the papule and axillary adenopathy, she developed a chill and a rapid elevation of temperature. During the next 3 weeks she experienced continuous fever varying from 100° to 103.2° F., associated with marked occipital headache, repeated chills and sweats and great prostration.

Several months previously it was discovered at the Miami Valley Hospital that Mrs. B. had a squamous cell carcinoma of the cervix uteri. She was advised to return to the hospital at stated intervals for the application of radium to the cervix. When she appeared in the hospital for this purpose on December 10, 1929, it was discovered that she was suffering from an unexplained fever. A careful physical examination revealed the presence of a papule and axillary adenopathy and careful questioning concerning contact with rabbits led to the history as outlined above.

On December 20, the axillary mass showed definite evidence of suppuration. The mass was incised and 3 ounces of thick purulent exudate escaped. On December 24, a discrete apruritic maculo-papular eruption developed in the skin of the left arm. The lesions disappeared in 3 days, leaving brownish discoloration at the site of the eruption. Four days later a similar eruption developed over the left lower extremity, which persisted for one week.

Serum of Mrs. A. B., collected on December 14, 12 days after the onset of illness, showed no anti*tularense* agglutinins. A second specimen collected on the eighteenth day of illness was found to agglutinate *Bacterium tularense* in all dilutions to 1:640. Similar results were obtained by Doctor Francis.

Case 6. Mrs. L. S. P., patient of Doctor J. W. Coombs, Camden, Ohio, a 43-year-old "beautician," hunted rabbits near Clinton, Tennessee, on November 11, 1929. While cleaning several rabbits she cut one hand with a knife and pierced the skin of the other hand with a sharp fragment of rabbit bone. On November 13, a papule appeared at the site of each of the perforations of the skin. Both hands became greatly swollen. The patient experienced repeated chills and sweats and fever varying from 100° to 103.4° F. The epitrochlear lymphnodes of both arms became greatly enlarged. Orange-size painful masses developed in both axillae. The recurring chills and sweats persisted for one month.

On February 25, the patient was seen for the first time by Doctor Coombs, who found fluctuation and suppuration of the epitrochlear and axillary lymph glands, which he incised. Suspecting tularemia, Doctor Coombs submitted a blood specimen for the agglutination reaction. This was found to agglutinate *Bacterium tularense* in all dilutions to 1:1280 with cross-agglutination of *Brucella abortus* in dilutions of 1:80.

Cases 7 and 8. Mr. G. H., age 51, and Mrs. G. H., age 45, patients of Doctor D. M. Blizzard of Middletown, Ohio, cooperated in dressing one cottontail rabbit which was presented to them on November 16, 1929. During the dressing of the rabbit Mr. and Mrs. H. received slight puncture wounds on their right index fingers from sharp fragments of rabbit bone. On November 18, Mrs. H. suffered from general malaise, muscle and joint pains, headache and an elevation of temperature to 100° F. Her right index finger became red and swollen and at the site of the injury a papule about three-eighths of an inch in diameter developed. The right axillary lymphnodes bacame enlarged and painful. The fever varied between 99° and 102° F. for one week. During the second week of illness the temperature remained practically at a normal level. No lymphangitis of the right arm was observed. The right axillary lymphnodes did not suppurate.

The onset of the husband's illness occurred on November 19. The symptoms were practically the same as those of his wife. The highest temperature recorded was 102° F. The fever continued for 2 weeks. The right axillary lymphnodes enlarged to the size of a hen's egg, but gave no evidence of suppuration.

The serums of Mr. and Mrs. G. H., collected on December 10, 1929, showed positive agglutination of *Bacterium tularense* in all dilutions to 1:640. Similar results were obtained by Doctor Francis.

COMMENT

The serologic findings in 3 of these cases (3, 4, 5) are of particular importance in that blood specimens collected on the thirteenth, ninth, and twelfth day following the onset of illness, respectively, gave entirely negative agglutination reactions. Second specimens collected on the twenty-sixth, twenty-seventh and eighteenth day of illness gave strongly positive agglutination reactions. Ordinarily, anti-*tularense* agglutinins appear in the serum dur-

ing the second week of illness. The lesson to be derived from our experience with these 3 cases is that repeated agglutination tests should be carried out in those cases in which the clinical picture of tularemia is strongly suggestive and in which the first or second agglutination tests have been negative.

The accidental discovery of tularemia in a woman (case 5) who had entered the hospital for another purpose, indicates the ease with which the presence of tularemia may be overlooked. This experience lends further strength to the writer's belief that the disease is much more widespread than the figures derived from the literature would appear to indicate.

TREATMENT

In the writer's original report of his experiences with the first 49 cases of tularemia occurring in and about Dayton, the suggestion was made that the intravenous introduction of whole blood or serum of individuals who had made a good recovery from tularemia might produce a favorable effect on the course of the disease. Since that time 8 Dayton patients suffering from the acute manifestations of the disease have been transfused with varying amounts (200 and 500 cc.) of blood from compatible donors who have made a complete recovery from the disease. This form of treatment appears to have arrested the progress of the disease.

A personal communication from Doctor Sydney R. Miller of Baltimore, tells of a very severe case of tularemia in which a fatal outcome seemed inevitable. The patient was given 75 cc. of convalescent serum intravenously. The serum was obtained from a recently recovered case of tularemia, in which the anti*tularense* agglutinin titer was 1:640. Within 12 hours the patient's temperature had dropped from 104° to 99° F. and he was subjectively much improved. The following day the temperature rose again to 103° F.; a similar quantity of immune serum was again given intravenously followed by an abrupt drop of the temperature to a normal level, following which there was practically no elevation of temperature and the patient made a rapid recovery.

These findings appear to indicate that the use of immune serum may have considerable value in the treatment of this disease. No definite conclusions can be drawn from the apparently favorable response in such a small number of cases. It is the writer's hope, however, that other investigators will give this method of treatment a trial and report their results.

SUMMARY AND CONCLUSIONS

1. Within the past 5 years tularemia has risen from comparative obscurity to the position of a major public health problem. Recent reports from Norway and Russia, together with previous reports from Japan and England, indicate that the disease is probably world-wide in its distribution.

2. Newly discovered animal hosts and insect vectors indicate the ever-widening spread of the disease and further insure its perpetuation. Many new sources of human infection other than the wild rabbit have been described.

3. Eighty-eight cases of tularemia have been encountered by the writer, 84 of which have occurred in or about Dayton, Ohio. This represents the largest number of cases to be discovered in such a circumscribed area.

4. The gross and microscopic pathology of tularemia as it occurs in man and animals is briefly described, together with a description of the experimental production of the ulceroglandular, oculoglandular and glandular forms of the disease in guinea pigs.

5. Eight recently encountered cases of tularemia are reported for the first time.

6. The use of immune human serum appears to have a favorable effect upon the course of the disease.

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TUBERCULOSIS OF THE SKIN*

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Introduction. Tuberculosis of the skin is occasionally encountered and, of course, early diagnosis is desirable. In some instances, it is essentially a local cutaneous manifestation; in other cases, it is a mirror of very serious organic involvement.

Tuberculosis of the skin is burdened with many superfluous names like many other dermatological entities. Terminology is naturally inconsequential; the important item is whether the suspected lesion is tuberculous or not. The unusually wide range and clinical variety of tuberculous lesions of the skin and mucous membranes makes the diagnosis difficult at times. A more extensive appreciation would soon increase its value as an aid in the diagnosis of systemic disease. It seems timely to emphasize the diagnostic earmarks to arouse suspicion enough in suspected cases to make a thorough study. Darier[1] states that the cutaneous manifestations of tuberculosis constitute at the present day an important chaper in dermatology. In this presentation only actual tuberculosis will be dealt with; there is still some confusion concerning several clinical entities which may be due to attentuated tuberculosis or due to the toxins of this bacillus. Sweany's[2] recent work brings up the possibility of mutation forms of the tubercle bacilli in producing some cutaneous syndromes.

Diagnostic Features. As emphasized by Stokes,[3] the accessibility of the skin to visual examination makes it possible to do in life what is denied in tuberculosis of deeper structures, to see the tubercle in situ. The cutaneous tubercle or apple jelly nodule can be seen by glass pressure which expresses the blood supply from the

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*Read before the Section of Medicine at the Eighty-first Annual Meeting of the Illinois State Medical Society at East St. Louis, Illinois, May 7, 1931.

inflamed surrounding tissue; it is well known that tubercles do not sharply differentiate certain types of cutaneous tuberculosis and in others, due to the violent destruction of tissue and organisms, the tubercles may not have time to form. However, the cutaneous tubercle is common enough in processes like lupus vulgaris, in the dry lupus vulgaris erythematoides, and in certain forms of inoculation tuberculosis to make its recognition very helpful in differentiating a tuberculous granuloma from other clinical entities.

Stokes describes the cutaneous tubercle as a small translucent brownish or apple-jelly colored infiltration, rarely more than 2 or 3 mm. in diameter, entirely invisible against its inflamatory background until the blood has been expressed from the surrounding tissue by pressure from some transparent object as a glass slide a glass tongue depressor, etc.

In cases of doubt, a small section can be excised under local anesthesia for pathological study. To one versed in dermatological histology, tuberculosis can usually be recognized by the microscopical picture. In some cases it is difficult to differentiate histologically from syphilis. In using the therapeutic test between syphilis and tuberculosis, it is well not to use any arsphenamin product for the latter has marked if only temporary non-specific effects in cutaneous tuberculosis. Mercury or bismuth should be used. A positive blood serological test would, of course, help favor the diagnosis of lues.

Clinically epithelioma, besides syphilis, may simulate tuberculosis. Epithelioma, of course, has a pearly border; its border is distinctly indurated, it rarely heals enough to form a scar. Epithelioma has quite a typical histological picture.

Tertiary cutaneous lues spreads peripherally, often has arciform configuration and leaves a smooth atrophic scar. Tuberculous scars are usually hypertrophic and the ulcers are non-indurated with ragged undermined borders. A coexistence of undoubtedly tuberculous manifestations may permit a presumptive conclusion.

In the past three years, some twenty-three cases of tuberculosis of the skin have been observed.

ILLUSTRATIVE CASE REPORTS

1. LUPUS VULGARIS ON FACE IN WOMAN OF 68

This name is usually applied to the type of chronic tuberculosis on the face (especially around nose) and occasionally on the trunk and extremities. It owes its traditional name to the ulcerating, gnawing, devouring tendency frequently assumed by it (Darier). It is the most common as well as one of the most polymorphous and most obstinate form of cutaneous tuberculosis. It usually begins in childhood.

This patient had had the lesions on the left side of her nose for three years, and the left cheek for three months. Her general health was excellent; x-ray examination of the chest reported no appreciable pathology. According to her history, she had had considerable x-ray and radium treatment to her nose; at least there were evidences of x-ray dermatitis, and keratoses, and a small beginning epithelioma from excessive x-ray. The latter was destroyed by electrothermy. The Kromayer lamp to the cheek, plus a high vitamine diet, has practically cleared the areas on her left cheek. (Diet will be discussed more in detail under therapy).

2. LUPUS VULGARIS ON BACK IN ADULT

Mrs. B. E., aged fifty-one, had had a slightly elevated brownish area on the right shoulder for ten years. She was seen through the courtesy of Dr. J. E. Kemp of the Dermatology Department of the Johns Hopkins Hospital in Baltimore, and was referred with the above diagnosis (which had been confirmed by histological section). A thorough examination at the above hospital had revealed no apparent internal visceral involvement. Treatment with the water cooled lamp has produced a clinical cure.

3. MULTIPLE DISSEMINATED TUBERCULOSIS OF SKIN FOLLOWING MEASLES

An office girl of nineteen had an eruption on her face and upper chest following measles at the age of eleven. The patient was seen through the kindness of Dr. E. J. Wexler. Her general health was excellent and no lung involvement was detected. Examination of the skin revealed four discrete nodules on her forehead, three on the left side of her face near the ear, and some six located irregularly on the upper chest. A biopsy taken from one on the left part of the chest shows the structure of typical tuberculosis. General alpine light treatments and a modified Gerson diet (discussed later) have produced almost entire clinical involution. This unusual form is not very common and usually occurs in children following one of the exanthemata.

4. WARTY OR VERRUCOUS TYPE

A young man of 24, a patient of Dr. Leslie MacNaughton, had warty lesions covering all the skin of the right buttock. There were no subjective symtoms and the lesions had developed in four months time. No tuberculosis was detected elsewhere. This type of tuberculosis is considered to be always produced by direct inoculation and hence is considered an inoculation

type of cutaneous tuberculosis. No direct contacts were found. This area in three months time has involuted 90 per cent under conservative treatment, and he has continued work all the time.

5. TUBERCULOUS ULCER

A young man of 29, of the athlete type, a patient of Dr. S. J. Sullivan, had had an ulceration around his anus for several weeks. The localization and the undermined border clinically was tuberculosis—a biopsy showed typical tuberculosis. X-ray of the chest showed an extensive active tuberculous involvement. Naturally systemic treatment was imperative, and he was placed in a sanitarium. However, the process was very active and he died in a few months' time. As a rule, tuberculous ulcer is observed only in already badly infected adults.

6. TUBERCULOSIS OF THE MOUTH

A young man of twenty-two (patient of Dr. H. H. Bozer) had a solitary ulcer on the roof of the mouth for several months. Clinically it was a text-book replica of a tuberculous ulcer; histologically, it was typical tuberculosis. It is well known that there are two seats of election for tuberculous ulcers, viz: in the mouth, on the lips, tongue, the inner aspect of the cheeks, the pharynx, or around the mouth; or,[3] at the anus and its surroundings Physical examination of this patient and repeated chest x-rays showed no apparent tuberculosis. Naturally this type of ulceration is usually associated with active pulmonary foci.

Treatments with the Kromayer lamp locally produced a clinical cure. Mucous membrane of the mouth is involved in many cases of cutaneous tuberculosis.

TREATMENT

The use of the alpine lamp, dietary measures, medication with phosphorized cod liver oil, and surgical electric-thermy comprise probably the best and most conservative management at the present time. Of course, in many cases, the general treatment of the patient is of extreme importance. In some patients, the general management which is necessary in internal visceral tuberculosis is applicable when the skin is manifestly secondarily involved.

A brief discussion of some of the new dietary measures is indicated — the following notes are freely quoted from Andrews.[4] A diet low in sodium chloride, protein and carbohydrate and rich in fats and vitamins was devised empirically by Gerson. Dr. Edgar Mayer stated "that definite healing was observed in advanced cases of lupus vulgaris of the face and mucous membranes that had previously been resistant to all other forms of accepted treatment. . . . These results were far more striking than those claimed for other forms of tuberculosis. . . . Within a few days after the beginning of the treatment a retrogression of the swelling and a change in the color in the vicinity of the lupus nodules were often noticed."

However, there are some contradictory reports. All in all, my personal experience has been quite favorable in a goodly number of this brief series. It was not used as strictly as Gerson originally advocated, and not used exclusively, but was combined with the local therapy.

Axmann[5] believes that lupus patients should receive the Gerson diet and the usual local therapy—as most of these patients are ambulatory, he believes in ambulatory treatment. He had marked success in fifty-five cases. He also points out that as yet it has not been determined whether the therapeutic results of this diet are due to the diet as a whole or to the phosphorized cod liver oil.

It is generally accepted that phototherapy heretofore has given the best results of any method yet employed. Radio therapy (x-ray and radium) is being discarded by more and more able men, although complete cures are apparently established in isolated cases. It is felt that the x-ray treatment must be pushed to the point of actual dermatitis to be of any material benefit in many cases which may result in disfiguring telangiectasia and worse yet in x-ray cancer.

Andrews has had very good results with surgical diathermy, followed by the alpine lamp. Gold salts have not given very good results in actual tuberculosis of the skin, although there have been a few isolated noteworthy achievements.

SUMMARY

Attention is called to the ever present possibility of tuberculosis of the skin and six illustrative cases are cited.

The possibility of this cutaneous finding being of immense importance in uncovering a more serious internal status must be kept in mind. In the words of Stokes, this last possibility means that the dermatologist at his best should not merely be a mouther of hard names, with a

specialty only half a centimeter deep, but an internist, whose major interest is that remarkably efficient and highly complex organ or rather group of organs, the skin.

104 South Michigan Avenue.

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DISCUSSION

Dr. W. B. Wakefield (Peoria): The important part of this paper, it seems, is to bring out the point that tuberculosis of the skin is really, after all, more or less a common disease, and we should ever be on the lookout for this condition when there is a skin disease, the etiology of which is not very clear. Almost anyone can recognize an ulcerated dermatitis or an ulcerated tubercular lesion, which latter however, is not very common in the districts that are not thickly populated. Probably in these latter localities we will undoubtedly have many more of the ulcerated types with the undermined edges. But it is the younger individuals, from sixteen to twenty-five years of age, who present oftentimes what apparently is an acne of one type or another, who really are infected with tuberculosis and require considerable observation, considerable time and study, in order to eliminate this disease as one of the possibilities of the etiology of the condition for which they seek relief. So, therefore, we should be rather slow in making a diagnosis in those conditions where their symptoms are not real clear.

The undermined edges of almost any open lesion that has existed for any length of time at all of course almost always point to tubercular borders which have broken down.

As to the use of bismuth or of mercury as a diagnostic feature in ruling out syphilis, we know that oftentimes arsenic will improve tubercular lesions to a considerable extent. Therapy with the quartz lamp is undoubtedly a useful agent in tuberculosis of the skin. The manufacturers of the lamps sometimes unduly raise our hopes as to their efficiency to cure many diseases, but here is one disease,—tuberculosis of the skin,—where it does seem to be at its greatest usefulness, and particularly the water-cooled lamp in the ulcerated types and in the tubercular wart.

Oftentimes, of course, those lesions can be removed by surgical means if they are small, and it is practical and is the best and easiest method.

I am greatly interested in Dr. White's diet. I do not know much about that.

I do not see very much tuberculosis of the skin, particularly of the older types. I have always been very much surprised to see the small amount of tuberculosis of the skin that is present in public institutions where this disease is treated,—in the sanitariums. It certainly is not a very common thing.

On the whole, the value of this paper consists in calling to our attention the fact that tuberculosis of the skin is probably more common than is generally known.

Dr. J. H. Fulgham (East St. Louis): This is a subject that does not come into the category of internal medicine to any great extent. In fact we rarely see it. Perhaps we do not recognize it. We internists should have our eyes open for dermal manifestations of tubercular disease.

I was glad to hear the Doctor discuss the relative prevalency of the Gerson treatment by the newer dietary measures that have been advocated and ultraviolet light. The chemical therapy, so-called, is the thing that has been often tried in various forms of tuberculosis, but it has never held attention very long.

I did not feel at the time that we heard a great deal about the Gerson treatment of skin diseases, vulgaris for instance, that this would long prove a valuable factor. I thought that it would probably soon wear out, and I think it has. After all, general measures of diet and hygienic control, as in almost all types of non-pulmonary tuberculous activity, and ultraviolet light seem to be advocated in bone and joint tuberculosis, glandular tuberculosis, chest tuberculosis, and skin tuberculosis.

Dr. Cleveland J. White, Chicago: The interesting part, as I said, is that most of these cases are seen in ambulatory practice. Even in those who have not reached the stage of ulceration, I think it is important in some to make biopsies. I think we get fooled occasionally by some of the non-suspected nodules because they are isolated and are not considered of much moment and are non-painful. The laboratory is extremely valuable at times.

To me the dermatological findings bring to the foreground the possibilities that it means to the patient's general health to interpret these and investigate further to see if there is any active internal tuberculosis.

I am both for and against the diet; as far as results are concerned, I saw several cases in Chicago that improved immediately on the Gerson diet along with other treatment and clinically became well. It especially means something to the young women who have tuberculosis involvement of the exposed parts to gain a cure without scarring.

Dr. Wakefield brought up the fact that tuberculosis of the skin is seldom seen in sanitariums. It is to be seen on the street, if you please, rather than in the tuberculosis institutions. Of course, the grossly infected ones are the ones who have the ulcerations.

HEART DISEASE, PREVENTION AND AFTER CARE*

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The consideration of etiology in making diagnoses and prescribing treatment and after care for those suffering with cardiac diseases assumes greater importance each succeeding year.

We know that heart disease ranks first in the list of causes of death at the present time. For every death from heart disease that occurs during a year there are probably ten persons living impaired and deficient lives because of the breakdown of the heart function.

Heart disease has been generally regarded as a disease of old age and, while it is true that the majority of deaths from this disease occur after the age of fifty, yet heart disease is just as important in the early years of life as many of the diseases commonly associated with childhood and early youth.

The above statements give only an incomplete idea of the great community problem and the amount of individual suffering and limitation of activity which can be known only to those who come in close contact with a large number of cases. It is the practicing physician who fully realizes the handicap endured by a sufferer from heart disease.

The causes giving rise to the impairment of the heart must be considered. Diseases of the heart may not result from a single cause, but may be the outcome of a combination of many. We have the so-called functional case in which the symptoms may be very distressing, but are not usually of very great importance unless allowed to continue for some length of time when they may result in permanent impairment. On the other hand there is the condition which is more serious in character and involves one of the heart itself, such as an impairment of the valves or musculature. This often follows an acute infection occurring elsewhere in the body, such as tonsillitis, dental infections, acute rheumatic fever or syphilis.

A large group of heart defects may be classified as those caused by degenerative diseases. In this group are included heart disease associated with arteriosclerosis, hypertension, nephritis, and many others. Approximately 40% of all heart cases are of this type. It is chronic in character and usually occurs in persons over the age of fifty. Reduction of this type of heart disease may be materially aided by the application of available knowledge of hygienic living.

The etiological factor of 10% of heart disease is syphilis. The application of known methods of prevention will in due time tend to bring about a marked decrease in cases of syphilitic heart disease.

Statistics supplied by the American Heart Association show that approximately 7 out of every 1,000 school children have some heart defect which impairs their general health, and between the ages of 10 to 14, heart disease is the greatest cause of death. The great number of heart affections discovered among children are directly attributable to some form of rheumatic infection. By many observers it has been conservatively estimated that 25% of all heart disease is due to rheumatic infection and that 75% of heart disease which occurs in children under the age of 10 is rheumatic, while only 10 to 15% of rheumatic heart disease occurs in persons over 40 years of age.

Rheumatic infection is very seldom found in children under three years of age and it is comparatively rare under four years. The maximum incidence is found between the ages of seven and nine. In children, rheumatic manifestations are more commonly found among girls than boys. The chronic forms of the disease show a much greater preponderance in this respect.

There seems to be no clear evidence that there is any notable difference between races as to susceptibility to rheumatic heart disease when not influenced by other factors. Rheumatic fever is unquestionably more prevalent in the temperate zones and is most common in a climate that is damp and cold. It is much more widespread than has been thought.

The part heredity plays in rheumatic heart disease is a mooted question although statistical evidence would tend to favor a very definite hereditary factor. However, this must be discounted by the fact that a disease with such a

*Read before the Joint Meeting of the Illinois State Medical Society, May 5, 1931, at East St. Louis.

wide prevalence might necessarily affect several members of any family.

The incidence of rheumatic infection as related to the seasons is not clearly marked. Wilson[1] reports from a study made during 1922 that 31% of the rheumatic manifestations occur during the winter; 33% in the spring; 29% in summer and 7% in the fall. Other writers state that the maximum incidence occurs in the autumn. Density of population seems to be a predisposing factor toward an increased incidence of this disease. Moreover, rheumatism in children is not as common among the well-to-do classes as in the artisan group. It is thought that rheumatic fever and its various manifestations is undoubtedly an infection, and it has been stated that rheumatism may be transmitted from person to person through direct contact. St. Lawrence[2] of New York made an investigation into the incidence of rheumatism and tuberculosis in families. He states that "in 100 families, in each of which at least one member had suffered from a manifestation of acute rheumatism, he found the percentage of cases of actual rheumatism among all the exposed persons to be 14.8; a similar investigation in respect to tuberculous families, in each of which at least one member had active tuberculosis, revealed the percentage of actual cases among persons exposed to be 14.6, and he points out that 'it is difficult to evade the proposition that rheumatic disease, and therefore cardiac disease, is communicable to a degree not generally imagined.'"

That rheumatism is an infective condition I think we can hardly question although the exact infecting organism is not known at present. It is believed that the most frequent portal of entry is through the tonsils. Frequent occurrence of tonsillitis before any other manifestations of rheumatism, tends strongly toward the support of this theory. It is possible, however, that the infection may enter through the nose, throat, alimentary tract, or decayed teeth. Rheumatic infection is now almost universally regarded as a general infection which, when the joints are involved, is spoken of as polyarthritis; when the brain is affected, as chorea or St. Vitus Dance; and when the heart is involved, as rheumatic heart disease. Although rheumatic infection may manifest itself as an involvement of the joints, or as chorea, it is important to realize that the heart is often affected simultaneously or just following these ailments, or more important still, that the heart may be the first and apparently the only organ involved, and that it is possible for this to occur without any other evidence of rheumatic fever other than signs and symptoms accompanying an acute carditis. But when there are no signs of cardiac involvement potential or possible heart disease must be considered.

St. Lawrence observed 65 children who had manifestations of rheumatic heart disease elsewhere than in the heart and these cases of potential cardiac disease, as he called them, were kept under observation and management for four and one-half years. At the end of that time 25% of them had developed a cardiac lesion of some kind; the remaining 75% he regards as certain to develop cardiac lesions as many of the children had constant severe recurrence of rheumatic fever or chorea, and when this occurs such persons rarely fail to eventually contract a lesion in the heart. He concludes that only when a child has remained free from recurrence of rheumatic manifestations for three years may recovery be regarded as fairly safe. Rheumatic heart disease should be regarded as one of the manifestations of rheumatic fever and not as a complication.

Other indications of rheumatic infection may be joint pains, muscle or growing pains, torticollis, tonsillitis, purpura or erythemata. In some cases there may be persistent fever and other signs of infection without definite clinical evidence of activity in any specific tissue. The idea that rheumatic fever is a disease characterized by polyarthritis, high fever and profuse sweating is not always applicable to the condition as it occurs in children. Often it manifests itself in the child as mild muscle or joint pains, chorea, or subcutaneous nodules. Rheumatic heart disease in many cases is subacute—it may be active or inactive.

In the active stage, there are often times very few symptoms to aid in diagnosing the rheumatic infection other than general malaise, loss of appetite, paleness and listlessness.

Rheumatic heart disease in its active stage manifests itself as carditis. As the name implies,

this is an infection of the heart involving acute inflammation of the pericardium, myocardium or the endocardium, either alone or in combination. Pancarditis, or inflammation of the three structures of the heart, occurs quite frequently, though not always. Myocarditis occurs in every case of rheumatic heart disease. The myocardial involvement may show itself in the active stages by evidence of acute myocarditis and, after healing, by permanent enlargement of the heart. Endocardial involvement shows itself in the active stages of rheumatic heart disease as acute endocarditis and valvulitis. Later, with healing, chronic structural changes in the valves remain, these being most commonly mitral insufficiency and stenosis. There is often a latent period of varying duration from the onset of the original rheumatic infection to the discovery of cardiac valvular disease. It has often been observed that definite signs of cardiac failure are frequently preceded, during a period of from two to six weeks, by a rather characteristic group of symptoms consisting in the main of loss of weight, a moderate daily rise in temperature, increased pulse rate, fatigue, diminished exercise tolerance and vital capacity.

Rheumatic heart disease is generally a chronic disease running an extremely variable course. Some patients die after a short severe course; others show a prolonged course with continuously active heart infection from the first attack until death, while others show alternate periods of activity and quiescence. Some, after one or more periods of active heart involvement, apparently remain free from infection for years.

The main point in considering rheumatic heart disease in children is not only the recognition of the disease, but its prevention, treatment and after care. As rheumatism is an infection, although the exact infective agent is unknown, its portal of entry should be sought. Diseased tonsils should be removed as tonsillectomy apparently is an important factor in controlling the recurrence of acute rheumatism and rheumatic pains. Unhealthy conditions of the nasopharynx should receive attention; decayed teeth and infected sinuses should be treated, and of extreme importance would be the fact of having every child who manifests any symptoms of rheumatic disease sent to a convalescent home or to the country for a long term of rest or quiet. Medicinal therapy has for its object the combatting of the rheumatic infection. Unfortunately, where damage has already been done to the heart, repair is hardly possible, but it may be that further harm could be prevented, providing every precaution is taken.

Those with rheumatic manifestations require complete rest in bed for as long as there is any indication of active disease, such as constitutional signs and symptoms, and changes in the physical signs from the cardiac standpoint; even improvement in the general condition should be accepted as an indication that active infective processes have not ceased. Although drugs are important as aids in carrying out treatment, they should not be allowed to replace rest, convalescence and improved hygienic living. Prolonged convalescence care is absolutely essential for children with rheumatic manifestations and unless this is provided the probability of developing rheumatic heart disease is greatly increased.

Children who have already acquired heart disease should have a careful physical examination in order that the degree of disability may be determined and their school activities curtailed. School children suffering from cardiac disease should be excused from running between classes; they should be asked to recite first and their home work should be regulated. For those who need it, corrective exercise should be recommended as this will enlarge the heart capacity and indirectly strengthen the heart where compensation of this organ has already been established.

The American Heart Association has evolved the following functional classification for those with heart disease:

FUNCTIONAL CAPACITY

1. Patients with organic heart disease, able to carry on ordinary physical activity without discomfort.
2. Patients with organic heart disease, unable to carry on ordinary physical activity without discomfort.
   a. Activity slightly limited.
   b. Activity greatly limited.
3. Patients with organic heart disease and with symptoms or signs of heart failure when at rest, unable to carry on any physical activity without discomfort.

E. POSSIBLE HEART DISEASE

Patients who show abnormal signs or symptoms referable to the heart but in whom the diagnosis of heart disease is uncertain.

F. Potential Heart Disease

Patients without circulatory disease whom it is advisable to follow because of the presence or history of an etiological factor which might cause heart disease.

If each child is placed in one of these groups, it will simplify to a marked degree the work of the physician, the public health nurse and the social worker in guiding the activities of the child.

A child who is known to have a heart impairment should be kept in bed or quiet at home for at least one or two months, or until all evidence of the activity of the infection has ceased. The general nutrition should be near normal and there should be an increase in weight. The period of convalescence should be increased should he show signs of cardiac muscle decompensation in the acute illness. Particular points that should be observed in the care of the child with heart trouble are:

1. The child should be carefully examined by a competent physician to ascertain if the condition is acute or chronic, and if active or quiet.
2. For those with an active heart condition, complete rest in bed, under the constant supervision of a physician, is essential.
3. In the quiescent, of which there are a far greater number, it is most important that proper rest, fresh air and food be provided.
4. All defects, such as diseased tonsils and infected teeth, should be corrected at once.
5. The proper kind of clothing should be provided to guard against wet feet and chilling of the body. Too much clothing, as well as too little, often results in chilling.
6. Proper vocational guidance is most important in order that the child may be trained for a desirable occupation as well as one within his physical capacity. The physician's advice in this regard is absolutely necessary.

It can be seen that the prevention of heart disease would naturally lessen the need for after care in all its phases. It would tend to lessen individual suffering and decrease the economic loss to the community which naturally results from an increase in the morbidity and mortality from heart disease. Each person who applies the available knowledge of hygiene to his daily mode of living will postpone the day of growing old and the likelihood of acquiring heart disease. If children could be protected against the infections which so often lead to heart disease, the chances of heart impairment would be greatly diminished. A most valuable aid of all would be the habit of having a thorough, adequate medical examination by a competent physician. It is a well known fact that the majority of people suffering from heart disease become aware of it accidentally. It is known too that heart impairment may often be entirely cured if taken at an early stage. Many persons suffering from heart disease may lead useful lives if they are willing to live within their limitations, but a favorable outcome is very doubtful unless the patient is constantly under competent medical care.

It is a well known fact that in many types of cardiac disease some degenerative condition or disability is often present for many years and before it actually occurs there is often complete invalidism and dependency on others.

In considering after care of persons suffering from cardiac disease it must be understood that each cardiac case presents its individual problems. Possibly there is definite cardiac psychology to be considered before any attempt can be made to successfully rehabilitate the cardiac who has had a breakdown. Whether this psychology differs from that which must be applied to the treatment of sufferers from other diseases is a matter well worth investigating. The average individual has mistaken ideas about heart disease and one of the first things to be considered in dealing with the cardiac is to overcome the fear of sudden death. We know that sudden death is an uncommon occurrence among heart sufferers. If we review our experiences with cardiac cases, it will be found that there are usually months, and often years, of gradually increasing invalidism before death. This fear of sudden death must be overcome before there can be any great improvement in the physical condition of the patient. We must emphasize the fact that all heart disease is not fatal, though it is more or less incapacitating. Most cardiacs must try to earn a living and it is quite possible, if the heart conditions be discovered early, to teach patients how to live and work without overtaxing their hearts. Thus we see that the cardiac case must be considered from the viewpoint of the individual rather than from the group.

Convalescent care for the cardiac is of the utmost importance. Those actually suffering from heart disease usually have a condition in which the heart is definitely and permanently impaired and the care of it becomes a life-long

problem. Following a breakdown, the cardiac is sent into the hospital for the period of acute illness. Unfortunately, due to the crowded condition of most of our hospitals, the cardiac is often discharged prematurely and if he returns to his home it is only a question of time until he is back in the hospital in a worse condition than before. The problem can only be solved successfully by having the cardiac understand the limitations within which he must live. This can be best accomplished in a well supervised convalescent home. The patient may then return to a modified routine of his daily life under the careful supervision of the private physician or the clinician.

It is necessary to provide convalescent care for the definite cardiac and also the potential cardiac as follows: 1. Those convalescing from infections which usually or occasionally damage the heart. 2. Those with actually impaired hearts who are recovering from infections. 3. Those with impaired hearts in which the condition is stationary or possibly slowly progressing. 4. Those with advanced heart conditions on the border-line of heart failure or where return to ordinary activity can only be of short duration.

It is important that a complete record of each cardiac be kept, this record to include the following: 1. All data bearing on the history of the patient. 2. A record of the physical examination. 3. Reports of the progress of the condition which is under observation. 4. A record of the patient's social and economic history. 5. An abstract of the salient features of the hospital history if the patient has been in the hospital.

In rehabilitation the question arises "How is the patient going to react to the diagnosis and the necessary adjustment and routine?" We must study the patient, learn his personality, and find out if he is stable or unstable in order that we may know just what to tell him concerning his diagnosis and how we shall present the necessary information to him. The physician is all important in this connection; the patient should never leave the office or clinic with fear. Any cardiac reserve should be explained and it may be necessary to furnish this information to the family. The cardiac should not be pampered to the extent of being made a chronic invalid when he is able to perform certain types of work without endangering himself. Often, when a patient is made to feel that he is a chronic invalid, a condition arises which is more of a handicap than the heart condition itself. We must instill hope in the patient, for heart disease, if properly cared for, may become stationary. There are very few school children unable to continue their studies, and education means a better earning capacity and less physical effort.

It is the young adult working his way and dependent upon his own earnings who is perhaps the most difficult type to adjust. He becomes despondent when he has to lay aside ambitions; often after repeated failure to carry on certain kinds of activity, and after many examinations by employers' physicians, he becomes indifferent to work of any kind. At this time it is essential to have the adjustment made as soon as possible for it is generally agreed that the majority of cardiacs are better off at work though the type and amount of work must be carefully considered.

After the breakdown and the subsequent period of convalescence, the cardiac is ready to be placed in a position suited to his decreased physical capacity. Perhaps no other disease handicaps the patient for self-support as long or as persistently as does heart disease. Today, with our increased attention to rehabilitation and occupational therapy, men and women handicapped by heart disease have been aided in finding work within their limitations and are able to provide for themselves and often those dependent upon them for support.

We have said before that each case presents its own problems. Like all workers, the cardiac wants employment that is congenial as well as work that comes within his physical capacity. His own desires and inclinations must be considered and as the cardiac is apt to worry about himself and become depressed, he should be adjusted to work and whenever possible be allowed to remain at his old trade. If it is necessary to find an entirely new occupation, it is very important that the placement worker have a definite and accurate report of the cardiac patient's condition. When a heart condition exists, it is absolutely necessary to depend upon the advice of the physician. The worker cannot proceed intelligently and placement cannot be made suc-

cessfully unless she knows how much each cardiac is capable of performing. This is being accomplished in accordance with the functional classification recommended by the American Heart Association.

There should be the closest cooperation between the schools, the social agencies, the day nurseries and other organizations. Referred cases should be diagnosed and any necessary instructions given. Boards of Health and Education are now seeking advice for guidance in their work with the school children.

Social service work is of the utmost importance and the nurse who is the medical social worker is absolutely essential in the rehabilitation of the cardiac. Without her it is impossible for the cardiologist to keep in touch with the patient. She not only familiarizes herself with the home conditions, but sees that the physician's instructions are carried out. The social worker may make suggestions for readjustment in the home and help to work out plans for industrial placement or vocational training with the proper agencies. She it is who helps to educate the child and his parents as to his limitations.

The need for constant medical supervision in the cardiac clinic or by the private physician cannot be over-emphasized. When cases have been referred to the clinic by the private physician and returned to him, he should realize that the same advice and adjustment is necessary, both medically and socially, as is given to the clinic patients, and that the medical social service of the clinic is available for his use in connection with referred cases.

It has not seemed within our province to discuss the question of medication, yet it may be well to state that our knowledge of heart disease has been greatly increased during the past century and particularly within the past decade. It is only within recent years that the use of certain drugs in the study of heart disease has been instituted. Important contributions in the study of heart disease have been made through the use of such instruments as the polioscope, the electrocardiograph and the sphygmomanometer and many other instruments. We now possess accurate and delicate methods for the study of drug action on the heart and the effort is being constantly made to propound drugs which will produce the desired effects in the treatment of heart disease. It would appear that we may look forward to further advances in the future. As previously stated, heart disease, if it is properly cared for may become stationary in many instances, and if the proper medical advice and supervision are provided, the individual's limitations and how he may live within them pointed out, many a cardiac may secure a position which can be acceptably filled. A happy and useful life may then be lived by many heart patients in spite of their handicap.

Adequate care of tonsillitis and sore throats which may be associated with rheumatic fever; prevention of cases of typhoid, diphtheria, scarlet fever, pneumonia and many other diseases; the reduction of syphilis; and saner and more temperate methods of living, will aid very materially in reducing heart impairments.

With a more general knowledge of the causes of heart disease, a wider recognition of the value of detecting minor abnormalities of the heart function in the incipient stages, and a wholehearted determination on the part of physicians and organized groups to work out plans for the eradication and amelioration of cardiac disease, much may be done to help the individual and lessen the consequent burden on the community.

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LYMPHOSARCOMA OF THE CECUM REPORT OF A CASE

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Incidence. The literature is not replete with reports on lymphosarcoma of the cecum. In search for statistical data of this lesion one must delve through numerous papers on sarcoma of the gastro-intestinal tract. It at once becomes

evident that, while lymphosarcoma of the cecum is a highly malignant disease, it is fortnuately a very rare condition. According to Rankin[1] only 300 cases of lymphosarcoma of the gastro-intestinal tract were reported up to 1928. Rankin and Chumley[2] report 18 cases of lymphosarcoma of the large intestine, 13 of which were cecal. Erdman and Clark[3] quote that during 15 years' study of post-mortem material at Prague only 13 cases were found in 13,036 sections. In relation to carcinomatous lesions of the gastro-intestinal tract all sarcomatous tumors constitute only 4%. The rarity of this condition is sufficient explanation for the infrequency of making a clinical diagnosis.

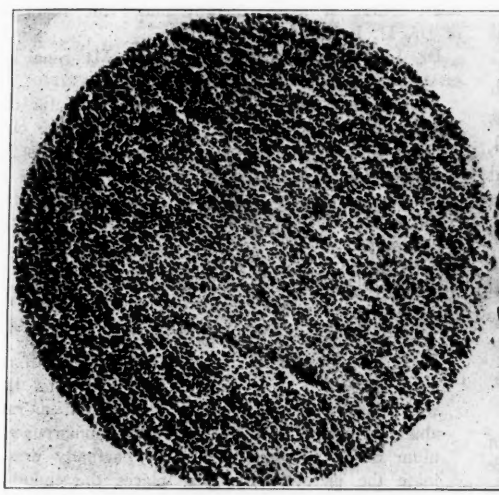

Fig. 1. Section from lymphosarcoma of cecum showing dense infiltration of cells, most of which are lymphocytes; magnification of 150 diameters.

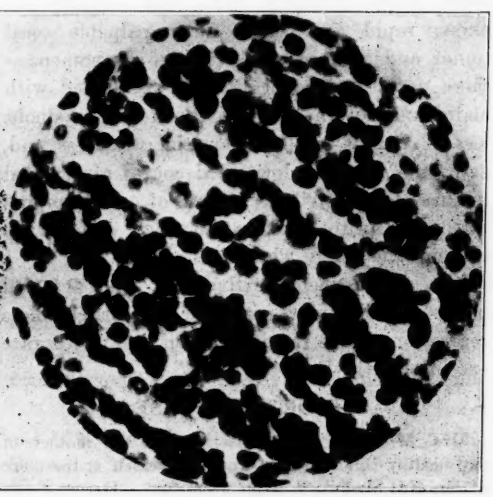

Fig. 2. Section from lymphosarcoma of cecum showing small and large lymphocytes with dark staining pyknotic nuclei and a rather abundant protoplasm; magnification of 900 diameters.

Pathology. The nature of this tumor, as well as of all lymphoid tumors, was not well defined for a long time. To Kundrat[4] belongs the credit for isolating lymphosarcoma from a group of closely allied diseases of the lymphatics, all of which were formerly included under the term of pseudoleukemia or aleukemic lymphoma. He it was who pointed out that in lymphosarcoma the systemic effects were not present—that it was primarily a regional disease. Ewing[5] defines lymphosarcoma as a true malignant neoplasm arising in the lymphatic tissue from a proliferation of atypical lymphocytes; he designates this type of tumor also as a lymphoblastoma and lymphocytoma. Mallory[6] employs the term lymphoblastoma to include lymphocytoma, lymphoma, lymbphosarcoma, pseudo-leukemia, lymphatic leukemia and Hodgkin's disease. MacCarty's[7] conception is that Hodgkin's disease, lymphosarcoma, and lymphatic leukemia have a common neoplastic cellular origin. In Hodgkin's disease the overgrowth of cells remains in the node; in lymphosarcoma the cells invade the surrounding tissue primarily; while in lymphatic leukemia there is at once a general invasion of the lymph and blood streams. But no reason is found explaining this variation in a common neoplastic cell! De Noyelles[8] believes that the predominating cell in lymphosarcoma is akin to the transitional mononuclear cells of the blood. But, due to chronic irritation or to some specific toxin, these cells take on a perverted role and develop into lymphosarcoma. Bargin[9], however, shatters this theory by proving that chronic irritation or toxemia have little influence on the genesis of this neoplasm. In a very extensive experience with chronic ulcerative colitis he found as a complication only 2 cases of lymphosarcoma. Obviously there is as yet no agreement as to the classification of lymphosarcoma—except that it is a lymphoid tumor of a malignant nature; and certain it is that at present most pathologists agree that there is confusion

and chaos when lymphoid tumors are under discussion.

Symptoms. A clinical diagnosis of this disease is very seldom made, since there are no signs or symptoms that distinguish this type of tumor from any other cecal tumor. Most often the patient complains of intermittent cramp-like abdominal pains, usually diffuse in character and but rarely accompanied by nausea or vomiting. Seldom are there obstructive phenomena; this being due to dilatation of the lumen, which is rather characteristic of this type of tumor. A palpable tumor appears early. Together with these three striking symptoms — cramp-like pains, rapid appearance of a palpable cecal tumor and absence of obstructive phenomena— there usually go other findings associated with malignancy of the bowel. Blood in the stools, loss of weight, pallor, anorexia, weakness and, as a rule, a rapid downward course give added features to the striking picture of cecal lymphosarcoma. As to treatment, Ewing[10] summarizes it comprehensively when he states:

"Local treatment, extirpation, and internal use of arsenic may cause marked or complete regression of the original lesion, but, with rare exceptions, the process recurs."

REPORT OF A CASE

Mrs. M. L., aged 26, married and the mother of two healthy children, first presented herself at the office of Dr. Ed. Skolnik in September, 1928. Her past and family history was practically negative. In July, 1928, she first began to suffer from cramp-like abdominal pains, especially in the region of the appendix. The pains would usually follow food intake and last from 2 to 24 hours and recur almost daily. There was no constipation, no nausea or vomiting and no blood in the stools. Within one month after onset of symptoms there ensued pallor, anorexia, weakness and loss in weight. Upon examination there was found a tumor mass in the ileo-cecal region; it was fixed, smooth, tender and the size of an orange. At operation on September 20, 1928, a smooth, non-encapsulated tumor mass was found in the ileo-cecal junction. The appendix was embedded in the center of the mass. The ileum was not involved, the wall of the cecum was somewhat thickened and there was no evidence of glandular or visceral metastases. The appendix was freed and removed in the usual manner and the mass dissected away as thoroughly as possible. The abdomen was closed without drainage.

The pathologist reported the mass to be a lymphosarcoma. The patient was thereupon advised to return for a course of x-ray therapy. But, instead, she left the city and was not seen again for two years, during which time she had received no care whatever. She had regained her weight, color, strength, and appetite and had not suffered from any abdominal disturbance whatever.

In October, 1930, she again began to experience the same symptom complex as in 1928 and when examined early in November, 1930, again revealed a tumor mass in the ileo-cecal area. A second operation was performed in November, 1930. The primary field of operation was absolutely clean and there was no regional or distal involvement. The cecum, however, was greatly thickened, smooth, free and within its lumen could easily be felt a circumferential tumor mass. Resection of the cecum and part of the ileum was done with end to end anastomosis. The patient made and uneventful recovery and left the hospital in two weeks. Within four weeks she received a thorough course of x-ray therapy under the supervision of Dr. M. I. Kaplan.

Dr. I. Davidsohn, pathologist at the Mt. Sinai Hospital, reported on the specimen as follows:

Gross: specimen consists of a cecum and the distal 3 cm. of the ileum. The mucous membrane of the ileum shows no abnormalities. The cecum is filled with a fungating growth originating from the mucous membrane or from the submucosa. It sits on the mucous membrane with a broad base and measures approximately 8x9 cm. The surface is smooth but uneven. The consistency is soft. The color of the cut surface is yellow in some and pink in other places. It is smooth.

Microscopically: sections from the growth (see Figs. 1 and 2) show a dense infiltration with cells, most of which are lymphocytes, small and large, with dark staining pyknotic nuclei and a rather abundant protoplasm. There are also numerous reticulum cells; in some places they actually predominate the picture. In other places the endothelial cells proliferate quite vividly. Milotic figures are numerous. The growth infiltrates the muscularis. Blood vessels are plentiful. Some are rather large and have only thin walls consisting merely of a lining of endothelial cells.

Diagnosis: Lymphosarcoma.

CONCLUSIONS

Considerable confusion still reigns in the classification of lymphoid tumors.

Lymphosarcoma of the cecum, while an extremely rare form of malignancy, should be considered when a young adult develops a tumor mass in the ileo-cecal region, which grows rapidly and gives rise to almost constant cramp-like pains and no symptoms of constipation.

The prognosis, at least from reports in the literature, is extremely poor.

A case is reported in which laparotomy and apparantly incomplete removal of the mass seemed to produce a cessation in the growth of a very malignant type of tumor.

Note: The patient, when seen last on May 12, 1931, was still in excellent condition.

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STUDIES IN CATATONIC STATES—EFFECTS OF TREATMENT ON THE COLLOIDS OF THE BLOOD IN CATATONICS*

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The protein in the plasma is not in true solution, but is in the form of colloid particles, easily recognized by the dark field illumination. In health, these particles are fairly small and uniform in size, deflect the light moderately and show very active brownian motion—normal *dispersion.*

In disease, due to acute infection or to chemical intoxication, the colloids undergo profound changes. The protein particles lose their activity and begin to divide into smaller, almost invisible, particles, some of which go into true solution, while some remain insoluble and tend to coalesce, forming large, white, often ringlike bodies, so-called giants—state of dehydration.

Long continued infections or chronic intoxication, give a different ultra-microscopic picture. The protein particles absorb water and metabolites. They increase in size and diminish in number. The particles are a brilliant white; they move slowly and when they agglutinate, the clumps formed contain fewer particles than those which are formed in dehydration; giants and ringed forms are frequent. These particles tend to precipitate individually or in masses. This state of the protein colloids is called hydration.

McDonagh,[1] of London, was the first to correlate these ultra-microscopic findings with physico-chemical changes in the serum. In dehydration, we find the sedimentation rate shortened; in hydration it is prolonged. The metabolites, as determined chemically, tend to increase in dehydration and to diminish in hydration. The refractometric index of the serum which is quite constant in health, is lowered in dehydration and raised in hydration; so also is the viscosity of the serum.

This colloidal picture of the blood is a guide by which to evaluate the effect of treatment. Certain drugs, like bromides, iodides, hexamethylene, mercury, the barbital group, the arsphenamines, digitalis, etc., act as dehydrators, but once the hydration is overcome, continued administration brings about toxic action. Thus the bromides and iodides produce acne; hexamethylene produces urinary tenesmus or hematuria; mercury salivation, etc.

Upon the other hand, other drugs produce hydration, the best example of which is insulin. When insulin is used, there is an increase in size of the colloidal protein particles and a decrease of the free metabolites, especially sugar, which becomes adsorbed. But, if an overdose of insulin is given, the sudden increase of the large hydrated particles may precipitate in the brain and cause the well-known insulin convulsion.

Having this changing colloidal picture of the blood in mind, we have undertaken, with the encouragement of Dr. Sidney D. Wilgus, Director of the State Psychopathic Institute, a study of the colloids in the blood of catatonics, with and without treatment.

About five or six years ago, Lorenz and Loevenhart[2] reported interesting observations on the awakening of stuporous patients after inhalation of a mixture of carbon dioxide and oxygen. They began with five per cent. carbon dioxide and rapidly increased the concentration to twenty per cent.; giving the gases for one minute. The period of stimulation lasted about five

*Read at the Chicago Neurological Society meeting held at the Elgin State Hospital, May 28, 1931.

minutes; the patients then relapsing into the former condition of catatonic stupor. Later, the concentration of carbon dioxide was increased and the length of the inhalation extended to two minutes. The period of stimulation was thus increased to ten or fifteen minutes. With modifications of this method, periods of stimulation lasting up to twenty-five minutes were obtained, but the patients always relapsed into their previous condition immediately after and no permanent benefit was observed.

Karl Langenstrass[3] has modified this method still further. He gives his patients a preliminary course of pyrotherapy, raising the temperature on alternate days to 104° F., or more, by intravenous injections of Coley's fluid or typhoid vaccine, giving about fifteen such injections. Following this, the inhalation of carbon dioxide and oxygen is given, beginning with five per cent. carbon dioxide and ninety-five per cent. oxygen, and gradually increasing the former to twenty-five per cent. and decreasing the latter to seventy-five per cent. At this point the inhalation is continued for from twenty-five to thirty minutes. Striking results are reported. Patients who were in stupor from ten months to ten years, improved gradually under this treatment and started to work in the institution; some have even gone home and to work. (Only six cases reported.)

We have adopted a different method of administering CO_2 and oxygen combinations *by subcutaneous injection* instead of inhalation, using the Bayeux instrument, which delivers a definite amount of gas per minute. Our object has been to discover what effect, if any, such therapy might have upon the colloids of the blood serum. Seven catatonics, all of them in almost complete stupor, have been studied thus far. Four to five injections of gas were given at about five day intervals. Physico-chemical and ultra-microscopic examination of the blood was done in all cases before treatment was started and all showed a marked hydration, as seen in the tables.

The first injection consisted of straight carbon dioxide, in doses of 1200 cc to 2500 cc, the male patients receiving the smaller amounts, the females the larger. In the former, the absorption of the gas was markedly slower than in the latter. In every case the colloids of the blood were dispersed to some extent, as indicated by lowering of the refractive index and viscosity, with alteration of the ultra-microscopic picture toward normal.

In the second injections we used a combination of thirty per cent. carbon dioxide and seventy per cent. oxygen in doses of 2000 cc to 3500 cc, with the result that most of the bloods returned to a state of hydration, although not quite so marked as before the first treatment. We returned then, in some of the patients, to straight carbon dioxide and injected doses as high as 5000 cc, and in others to the combined gases with doses as high as 10,000 cc. We obtained indefinite results. For the fourth and fifth injections, we used in all cases but 500 cc of straight carbon dioxide and in all cases the colloids showed again relative dehydration.

In studying the tables, it is apparent that the refractive index before treatment was above normal in all our cases, ranging from 1.3509 to 1.3541 (1.3500 in normals). The viscosity was also high in all, sometimes as high as 2.3 times water (against 1.5 to 1.75 times water in normals). The ultra-microscopic picture showed, in six of our cases, hydration with precipitation, two of them having, in addition, globulin rings. One case, No. 6, gave a picture of dehydration. After the carbon dioxide treatments the refractive index in all cases came down, the highest being 1.3507, and 1.3482 being the lowest. The viscosity in all cases also came down, as low as 1.6 times water in case No. 6. The ultra-microscopic picture after the treatment gave evidence of dehydration in all and in cases Nos. 2, 5 and 7, even some dispersion.

Clinically, slight improvement occurred at times, but nothing really significant.

Our studies thus far appeared to indicate that:

1. In the physico-chemical and ultra-microscopic examinations of the blood, we have the objective method of evaluating the effect of treatments.

2. The colloids in the blood of catatonics are in a state of hydration.

3. Carbon dioxide is a dehydrator.

4. The mere dehydration of the colloids in catatonics is not sufficient to bring about remission.

5. There must be other underlying conditions

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TABLE 1

CASE	SEDIMENTATION			SUGAR			REFRACTIVE INDEX		
	BEFORE Treatment	AFTER CO_2	AFTER Vaccine	BEFORE Treatment	AFTER Treatment	AFTER CO_2	BEFORE Vaccine	AFTER CO_2	AFTER Vaccine
1. M.B.	.....	2'9"	2'39"	70 MG	112 MG	83 MG	1.3523	1.3503	1.3527
2. H.D.	1'50"	1'24"	2'10"	125 MG	158 MG	126 MG	1.3541	1.3503	1.3502
3. F.G.	.....	1'45"	2'12"	110 MG	155 MG	70 MG	1.3511	1.3499	1.3491
4. J.K.	.....	2'20"	2'21"	120 MG	150 MG	72 MG	1.3509	1.3502	1.3512
5. W.R.	1'25"	1'24"	2'56"	150 MG	145 MG	84 MG	1.3521	1.3507	1.3504
6. C.S.	30"	1'9"	1'35"	180 MG	175 MG	90 MG	1.3520	1.3482	1.3492
7. J.S.	1'45"	45"	28"	134 MG	102 MG	75 MG	1.3530	1.3490	1.3505

which must be studied in every case individually and treated accordingly.

Nevertheless, we made one more attempt to treat the same group with one general method, turning our attention this time to intestinal detoxication.

We gave, by subcutaneous injections, a stock vaccine, consisting of strains of hemolytic streptococci and pathogenic gram-negative bacteria. A second vaccine, consisting of non-lactose fermenters, we injected intramuscularly. Eleven injections were given in a period of six weeks. The stock vaccine was given at weekly intervals, 1 cc, increasing the dose by 0.1 cc at each subsequent injection; the other vaccine three or four days after the first, 1 cc intramuscularly each time. In conjunction with the vaccine, dihydranol (a hydroxyphenyl derivative of heptane) was used. Three of our patients did not cooperate in taking it. These patients were given a forty per cent. solution of sodium ricineolate in twenty drop doses after meals..

The results, in general, after the vaccine therapy, were much less encouraging than those obtained with carbon dioxide—(See tables.) After vaccine therapy, Case No. 1 came back to hydration. The refractive index went as high as 1.3527, higher than it was even before the

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TABLE 2

CASE	VISCOSITY			ULTRA MICROSCOPIC		
	BEFORE Treatment	AFTER CO_2	AFTER Vaccine	BEFORE Treatment	AFTER CO_2	AFTER Vaccine
1. M.B.	1.9 / 1	1.7 / 1	1.8 / 1	Hydration Precipitation	Evidence of Dehydration	Evidence of Hydration
2. H.D.	2.3 / 1	1.8 / 1	1.6 / 1	Hydration Precipitation	Evidence of Dehydration	Evidence of Dispersion
3. F.G.	2.2 / 1	1.7 / 1	1.5 / 1	Hydration Precipitation Rings	Dehydration Some Dispersion	Evidence of Dispersion, After Adding CO_2
4. J.K.	1.9 / 1	1.7 / 1	1.65 / 1	Hydration	Evidence of Dehydration	Evidence of Hydration
5. W.R.	1.9 / 1	1.8 / 1	1.65 / 1	Hydration Rings	Some Dispersion Few Rings	Evidence of Dispersion
6. C.S.	2.2 / 1	1.6 / 1	1.6 / 1	Dehydration Secondary Hydration	Dehydration	Some Dispersion Some Hydration
7. J.S.	2.2 / 1	1.8 / 1	1.6 / 1	Hydration Precipitation	Dehydration Some Dispersion	Evidence of Hydro Dehydration

CO_2 treatment. In Case No. 3, we were able to keep the refractive index down only by adding injections of CO_2 to the vaccine therapy. In Case No. 4, the refractive index was 1.3509 before the treatments; was brought down after CO_2 to 1.3502, and after vaccine therapy went up to 1.3512. The ultra-micoscopic picture in this case showed again hydration. Case No. 5 shows the best blood picture and this case did best clinically under the vaccine therapy. In Cases No. 6 and No. 7, the blood came back nearer to the picture of hydration.

Clinically, only one case showed a definite improvement, and one a very slight improvement. The remainder relapsed into the condition observed previous to CO_2 therapy.

Thus far in our limited experience administration of CO_2 seems to offer the more promising field of study as evidenced by the results on the blood colloids shown in the table. Should we give smaller doses and repeat them oftener? Does fever therapy increase the CO_2 of the plasma and tissues and thus correct the alkalosis and hydration percent? More work will be required along those lines before coming to definite conclusions. We hope to follow up this preliminary report with further studies, both of a laboratory and chemical nature.

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REGARDING THE ETIOLOGY OF CHICKENPOX*

AND

HUGH MACDONALD, S. B., M. D.

EDITH J. MACDONALD, R. N.

EVANSTON, ILL.

Steiner[1] in 1875 and d'Heilly and Thoinot[2] in 1885 demonstrated that the vaccination of susceptible individuals with fresh lymph from chickenpox vesicles produced a local reaction, consisting of a red macula which subsequently went through the stages of vesicle and crust. More recenly Kling,[3] Handrick,[4] Rabinoff,[5] Michael,[6] Greenthal[7] and others have shown that vaccination with the fresh lymph not only might produce a local lesion but also a short period of immunity. Hess and Unger,[8] in susceptible children, with greatly diluted lymph were unable to produce the disease experimentally: first by the injection of diluted chickenpox vesicle lymph intravenously in 38 cases, intracutaneously in 16, and subcutaneously in 10; and secondly by the application of the diluted lymph on the skin (v. Pirquet method) in 3, in the nostrils in 3, in the mouth in 3, and in the nose and mouth in 4. On the other hand Hotzen,[9] with undiluted vesicle lymph reported a generalized eruption, resembling clinical chickenpox, in a considerable number of infants after vaccination. This post-vaccination eruption has been recorded by others also. Caronia[10] produced chickenpox in an unexposed child by the injection of blood from a patient early in the disease. Rivers[11] and others failed by cutaneous or intravenous inoculations to produce the disease in animals (monkeys, rabbits, guinea pigs, white rats, and chickens).

Bacteriological studies of the blood and vesicle lymph were first reported successful by Auricchio[12] in 1924. He isolated from the blood and vesicle lymph of 20 cases (using Tarozzi-Noguchi anaerobic medium) a small coccus which occurred singly or in pairs and stained gram positive. This organism was transplanted repeatedly in this medium but failed to grow in the more common mediums. Identical bodies were observed by him in smear preparations made directly from the fresh vesicles. In the blood serum of convalescents he demonstrated constantly the presence of complement fixing bodies.

We wish to report the results of work with the microorganism of chickenpox, results of human inoculations, and an attempt to fulfill Koch's postulates. A micrococcus was found constantly in smear preparations from early intact vesicles and of blood in 7 successive cases. It was spherical and occurred singly, occasionally as a diplococcus, but apparently never in chains or clusters. It measured 0.5 microns in diameter and was non-motile. It stained with the common stains and was gram positive. By Loeffler's method† one to four — usually one — flagellae were present. Encapsulation was not demonstrable. It grew feebly in a liquid medium consisting of Bacto veal infusion both en-

*Received for publication January 31, 1931.

riched with 1% proteose peptone, aerobically and anaerobically, incubating at 37 C. The growth was determined microscopically by the numerical increase of the organisms (bacterial-count-method), rather than by the gross appearance of increasing turbidity of the medium. Three to 4 weeks of cultivation were required before much growth was apparent. Cultures from the blood grew much better than those from the vesicle lymph. The organism grew slowly on blood agar plates in pure culture, appearing in 5 to 7 days as minute colorless, transparent elevations with regular margins. However, when other bacteria were added to the broth or plate cultures more abundant growth took place. No gas formation was observed in the following sugar mediums: dextrose, levulose, galactose, mannite, maltose, lactose, sucrose, dextrin, inulin and salicin (Dr. J. Lyle Williams). A small portion of the microorganisms passed through a tested Berkefeld filter W (fine), the bulk being retained by the filter. The microorganism, for which we suggest the name *Micrococus varicellae,* was present in but small numbers in intact early vesicles; more abundant in vesicles secondarily infected.

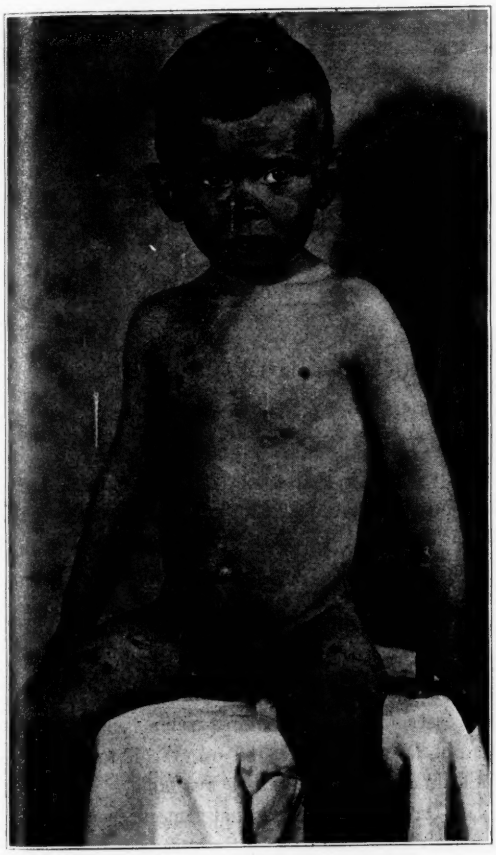

Fig. 1. Photograph of child 20 mos. old on the 4th day of chickenpox eruption.

To rule out any untoward results in later inoculation experiments, the living culture to be used was first tested out by an intra-cutaneous injection into an immune adult. No local or general reaction occurred during 25 days of observation. For the inoculation experiment 4 children (ages 20 mos., 3 yrs., 3 yrs., and 4.5 yrs. respectively) were employed, with the full consent and cooperation of their parents. While these children were not quarantined previous to the experiment, infection from natural sources was felt to be unlikely because they lived in a sparsely settled locality, came in contact with but few persons and these persons were for the most part also susceptible and remained free of the disease. Each child was given 3 drops of a 5 months old dextrose peptone broth culture by mouth. This culture was the first subculture of one obtained from blood. One of the children (age 20 mos.) was simultaneously injected subcutaneously with 1 cc. of the same culture, previously mixed with phenol (1%), heated at 60 C. for 10 min. and at 37 C. for 24 hrs. Immediately following the inoculations no signs of local inflammation or febrile reaction were observed. But on the 18th day after the inoculations the child (age 20 mos.) Fig. 1., who had had also the subcutaneous injection of heated phenolated culture, developed a typical chickenpox eruption with fever of 5 days duration. Similar eruptions occurred in the other 3 children on the 31st, 32nd and 34th days respectively. In all these children the smear preparations of intact vesicles and the cultures from intact vesicles and the blood showed morphologically and culturally the same organism as the one given originally by mouth. Complement fixation tests were made (Dr. J. Lyle Williams) on the blood during convalescence of 2 of these children (20

†Staining with warm, freshly filtered Loeffler's flagella stain for several minutes, washing with acid alcohol and restaining with Giemsa's stain for 10-15 minutes gave especially satisfactory results.

mos. and 4.5 yrs. respectively). In these tests the uncentrifugalized cultures from vesicle lymph (consisting of 4% dextrose, 1.5% peptone and water) were used as antigen. The results were as follows: Convalescent serum and undiluted antigen, 100% fixation with 0.3 cc., 75% with 0.2 cc., and 25% with 0.1 cc. Convalescent serum with antigen diluted 1 to 10 with physiological salt solution: clearly negative with 1 cc., 0.5 cc., 0.2 cc., and 0.1 cc. With non-immune blood serum and undiluted antigen: clearly negative with 0.3 cc., 0.2 cc., and 0.1 cc. of antigen. Undiluted antigen without serum: clearly negative with 0.3 cc., 0.2 cc., and 0.1 cc. of antigen.

COMMENT:

The culture used for oral administration had been growing in the same tube for 5 months. The failure of 3 of the 4 children to contract chickenpox in the usual incubation period suggests that the microorganism, although living, was attenuated. The positive infection in the child receiving the subcutaneous inoculation of heated phenolated culture corresponds with the results obtained by Gordon[13] working with the smallpox virus. He reported that rabbits inoculated subcutaneously with a suspension of smallpox virus killed with phenol were later more susceptible to skin inoculations with the cowpox virus than normal rabbits or rabbits receiving the subcutaneous injection of smallpox virus but without phenol.

SUMMARY AND CONCLUSIONS:

Confirmatory to the report of Auricchio[12] a microorganism, (*Micrococcus varicellae*), was found in smear preparations of intact vesicle lymph and successfully grown in pure cultures from the vesicles and blood of 7 successive cases of chickenpox. The authors report the successful production of chickenpox in one child on the 18th day after oral administration of a pure culture. A morphologically and culturally similar micrococcus was regained from this patient's vesicles and blood. Complement fixation tests on convalescent blood, using the micrococcus as antigen, were positive.

While the possibility of the presence of an additional and invisible virus in the medium was not eliminated, it appears reasonable to believe that the organism described is pathogenic and the causative bacterium of chickenpox.

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Foot Note: The authors are indebted to Dr. J. Lyle Williams and his associates in the Laboratory of the Evanston Hospital for performing the bacteriologic studies on the various sugars and making the complement fixation tests.

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UNDULANT FEVER*
(THE MIMIC DISEASE)

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Early in the fall of 1929, I attended the Fulton County Medical Society Meeting, at which Dr. E. E. Davis of Avon, reported a case of undulant fever. He explained that in a September issue of the *Journal, A. M. A.* an article was published on this disease. He gave extracts from this article and I became extremely interested because for the past nine or ten years I had seen cases of this and many other types which did not fit anything I had ever been taught or could find in the literature available.

Dr. Davis said that at that time a case of his had been puzzling him, as the symptoms did not fit any definite entity, but he thought his patient might have T. B. He drew off some blood, and to his surprise the laboratory diagnosis was undulant fever.

I could not wait to shake Dr. Davis' hand and tell him that this was the most interesting article that I had heard at any meeting I had ever attended. I read this article in the September issue of the *Journal, A. M. A.* over and over again.

The description of this disease fits certain

*Read before Section on Public Health and Hygiene, Illinois State Medical Society, May 7, 1931, East St. Louis.

atypical cases that I had attended during the past 9 or 10 years.

About a month later I had my first case of undulant fever. In the middle of the night I was called to see:

Case 1. Florence H. Aged 38 years.

She had a temperature of 104, was sitting up in bed grasping her left breast and saying "that she was going to die," and, frankly, to myself I agreed with her. She acted like a syphilitic aortitis, but had no heart murmur, and her temperature of 104 did not fit such a diagnosis. The next day she was markedly tender over the gall bladder region. I then thought she had a gall bladder infection, with toxic manifestations. In a few days this proved false. She then began to sweat and her temperature ran in waves. I drew off some of her blood and the laboratory diagnosis was undulant fever.

Case 2. Keith H. Aged 6 years.

Ten days later this lady's son began to run a temperature and he laid around on the couch. Physical examination was negative except a large spleen and fever. The laboratory gave a positive report for undulant fever.

Case 3. Aaron H. Aged 13 years.

About a month later, another son was brought to my office, with a severe abdominal pain. Examination was otherwise negative. It took ½ grain of morphine hypodermically to relieve him, so he could return home. I told the father that if his son's "belly" was tight or tender in certain places, I would refer his boy to a surgeon.

The next day the boy was returned to my office with a pain more severe than the day before. Again a ¼ grain of morphine was given without relief. After two or three hours waiting I gave him morphine ⅛ grain, hyocine 1/300 grain and prompt relief of pain resulted. I told the father that the boy's symptoms did not warrant a diagnosis of appendicitis or kidney stone and I did not know to what his pain was due. The father suggested that the boy might have developed the same condition that his mother and younger brother had, but I knew better, since the boy had no temperature, no enlarged spleen, no sweats, etc. The father asked why I was so sure, since I had told him I did not know anything about undulant fever and no one else knew much more. I agreed to submit a sample of his blood, which proved to be positive to undulant fever agglutination. We must admit that these farmers have sound reasoning.

For the next 16 months, I drew blood from puzzling cases from time to time but all were negative, and I would promptly dismiss undulant as a possibility.

On February 27, 1931, Clarence B., a father of four children, called me from Macomb and requested that I go to his home, take plenty of time and look his family over and see what was wrong with them. He stated that they had all been sick for the past two months.

The father and mother told me about their two months' illness. I questioned the father about their cows. They had only one and it had been necessary for the veterinarian to remove the placenta at her last calfing time, and she had been in heat ever since. A three-year-old heifer was also in heat all the time and would not become with calf. I asked him to have a veterinarian draw blood from the cow and I drew blood from the entire family, except a two-year-old baby girl.

The laboratory report was Bang's disease in the cow and undulant fever in:

Case 4. Elaine B. Aged 16 years. Daughter of Clarence B.

She had been nervous and irritable for three months, had some joint stiffness, lost seven pounds in weight, but was feeling better again at that particular time. Examination proved negative with the exception of an enlarged spleen.

I immediattely wrote to the Health Department, stating that in my opinion if Elaine B. was undulant, all three other children of Clarence B. also were undulant. Dr. McShane and Dr. Shaughnessy answered with extremely helpful letters, explaining that from the history of the cases, and since the family cow was a reactor, there was a strong possibility that the other three children also had undulant fever, and that it required about 28 days after the onset of the disease to obtain a positive agglutination test. They also requested additional specimens from the entire family at a later date, with which I complied. The report showed two of the four specimens to be positive and two were hemolyzed.

Case 5. Gertrude B. Aged 38 years; wife of Clarence B.

Her only symptoms were fatigue, sore joints and nervousness. She complained of the children driving her to distraction, which they had never done before.

Case 6. Howard B. Aged 13 years; son of Clarence B.

Had what has been called "flu" by the public and many physicians since 1918-1919, but which I personally have called the "prevailing sickness," as I did not know what it was, but did not believe it to be influenza in many of the cases. The boy's illness began apparently with a cold, pain in the abdomen, followed by jaundice, obstinate constipation, loss of weight and a cough that persisted with no lung findings to account for it.

Case 7. Genevieve C.; aged 28 years.

I was called to see her in the middle of the night. She had a temperature of 104, and complained of severe pain around the heart. One-half grain of morphine only partially relieved her in four hours. Six hours later a ¼ grain of morphine was given with only partial relief. Sixteen hours later a H. M. C. was given and relieved all pain. The heart was normal, and I could find nothing to explain this severe pain and high fever. Up until then I thought her a beginning lobar pneumonia.

The next morning she was so tender over the whole left chest that she could not stand to be touched. I then told the family it was a neuritis in the chest wall,

but no neuritis that I knew about would be that severe, except herpes zoster and with that she would break out locally with a rash. In a few days a few red spots appeared on the chest, abdomen and back, but they looked like rose spots of typhoid fever. To my utter surprise a test for undulant fever was positive.

I then wrote to the Health Department, giving case histories of most of my undulant fever patients and requested information concerning the disease. I was instructed to write to the Superintendent of Documents, Washington, D. C., for Bulletin No. 158, issued by the National Institute of Health of the U. S. Treasury Department, which I did. About a month later the bulletin came. For the next week I read and re-read this bulletin and found case reports fitting practically all cases that had worried me during the past nine or ten years. I began to call in these loyal, faithful patients who had searched for their health, and began to send blood to the State Laboratory for undulant fever agglutination tests.

Since then, by carefully selecting these cases, I have twenty-one additional positive undulant cases. That is, twenty-eight in all.

From November 2, 1929, until May 4, 1931, inclusive, 95 specimens of blood and milk have been submitted for the undulant fever test, with the following results:

6 were negative repeats.

1 positive report was on a Jersey cow.

7 negative reports were on cow's milk.

8 specimens of blood were hemolyzed in transit.

1 specimen was not of sufficient quantity.

1 specimen container was broken in transit, leaving a balance of 28 positive reports out of 71 human suspects.

It is a mimic disease, but like all mimics it lacks one or two of the essential characteristics of the real entities with which it may be confused. I found it mimicking and masquerading:

Gall bladder disease, pulmonary T. B., T. B. of the kidney, acute appendicitis, arthritis, acute rheumatic fever, chorea, stomach ulcer, non-specific vaginitis, pyelitis, so-called chronic "flu," myasthenia gravis, herpes zoster, cancer of the cervix and our old friend, neurasthenia.

If the undulant agglutination test has any value, and if these cases actually have now or have had undulant fever in the past, and if this disease is as generally prevailing as it is locally, the task of cleaning up the domestic animals who apparently harbor this disease and transmit it to mankind, will outrival that of cleaning out the swamps in the Canal Zone by General Goethals.

A great step awaits us in preventive medicine, unless this undulant fever agglutination test can be discredited.

DISCUSSION

Dr. H. S. Houston, Springfield, Ill.: I have enjoyed listening to Dr. Stites' paper, and I believe that it gives a pretty clear picture of the disease as it is met with in practice. Our own Division has compiled brief reports on a number of cases which have been brought to our attention, and I am in possession of a few figures obtained from the State Department of Vital Statistics from whose records I was able to get some information with regard to undulant fever deaths during the past five years. In 1930 there were 63 cases reported and 6 deaths; in 1929, 37 cases with 2 deaths; in 1928, 26 cases with no deaths; in 1927, 5 cases with no deaths. For the year 1926 we received no reports of either cases or deaths. These figures, of course, are not an accurate index to the real undulent fever situation in this state inasmuch as a number of cases, so diagnosed, were not reported, and it is likely also that a considerable number of cases have not been recognized. There is one thing, however, that we can learn from this information and that is, that in the past two or three years some progress has been made in the recognition and control of undulant fever. The question naturally arises with regard to handling the situation now that we are beginning to get some information about it. So far, the only measures available seem to be those of a prophylactic nature, emphasis being placed upon the removal of sources of infection and the pasteurization of milk supplies. Milk from infected herds should necessarily be pasteurized and I am wondering whether it would not be more profitable, in the long run, to eliminate infected animals because of the fact that they become economically unprofitable anyway.

The death rate from undulent fever, according to the available information that we have, does not amount to a great deal, approximately less than two per cent. The chief difficulty is the long period of debilitation of the patient, and therein lies the importance of this disease as an economic and public health problem.

Symptoms of the disease are fairly clear but added to undulant fever symptoms are those of several other conditions. Fever is perhaps the most constant and most variable. Of course, here as well as in other diseases involving infectious organisms, there is a definite bacteremia and patients develop septic symptoms. While we can not describe a text-book picture of undulant fever we may say that the temperature curves seem to adopt a rather typical pattern. Following the onset of the disease and particularly after the temperature begins to rise there seems to be a step-like gradation from one day to the next. The high point and low

point on a given day being slightly higher than they were on the day before with perhaps a slight remission in the morning. This may continue until a temperature of 103 or 104 is reached and then the temperature begins to recede in a like manner, going down a little bit day by day and each day the high point and low point being slightly lower than the day before. A given case seems to show individually a more or less definite interval between these exacerbations in temperature and other symptoms. Some cases will show a regular course with intervals anywhere from three or four days up to perhaps several weeks between periods of temperature elevation. Those infected with the melitensis type of organism seem to exhibit a somewhat longer interval between the undulations of temperature, and other symptoms. Cases infected with the bovine and porcine type seem to run very similar courses. My point is that in a given case once the temperature curve is established it seems to follow the same pattern pretty well throughout the course of the disease.

Chills and sweats are very closely associated, naturally, with the temperature manifestations. Sweats are extremely profuse in many cases, however, they are variable. The onset of chills seems to vary with the changes in temperature which may occur. I have had occasion to see a few cases that complain of severe headache and backache, especially at the onset. I don't believe that that is a constant symptom and I wonder whether Dr. Stites has observed it in the cases which he has attended. Pain in the joints and other symptoms of arthritis along with neuritis seem to be rather constant, and the evidence indicates that neuritis in the majority of cases is probably responsible for the joint manifestations. Depression, irritability, variable neuroses and definite psychic manifestations have been found along with other functional nervous disorders.

In rural districts there seems to be a slightly greater number of cases in women than in men. I do not know whether that can be borne out in a large number of cases but the information available indicates that it is true. Perhaps women, at least in the rural districts, are exposed to infection more often through handling milk than are men.

Inasmuch as this disease is fundamentally a cause of abortion, at least in the lower animals, I am wondering how many positive agglutination tests we would get in the routine examination of blood specimens from women complaining of sterility. There are a certain number of such patients, examination of whom does not show any plausible explanation for sterility. Agglutination tests of these would be of interest. Another question arises with regard to the role taken by the endocrine system in case of undulant fever. Occasionally mild ambulatory cases of undulant fever show symptoms somewhat similar to those of hypothyroidism, and low basal metabolic rates have been found in a few. I am wondering whether studies in basal metabolism might throw a little light on the subject.

Organs that seem to be particularly involved include the spleen, kidneys and liver. I believe organisms have been recovered also from lymph glands.

Treatment of the disease must assume a symptomatic nature. While the disease frequently runs a very long course it seems to be rather self-limited after all, and treatment is governed to a great extent by the individual symptoms as they arise. Some investigators seem to feel that favorable results have been obtained from the use of bacterial vaccine and results of such treatment seem definitely encouraging. The vaccine preparations which are available are slightly variable as to their content of dead organisms, usually varying between two billion and six billion per cubic centimeter. Results indicate that vaccine is likely to be of most value if it is given when the temperature curve is on the rise. Treatment with aniline dyes intravenously has been tried, and the solutions used mostly are mercurochrome and acriflavine. Results indicate that solutions strong enough to be effective can not be safely administered on account of their toxicity to the patient, and there is also the possibility that such doses would be sufficiently diluted in the blood stream to become ineffective.

You may wonder why there have been so many cases showing positive tests around Industry and not in other communities. Physicians in that particular community are especially interested and are submitting blood specimens from selected cases as suspects, and it may be that members of the profession generally are not on the lookout for possible cases as much as they seem to be in this particular locality in question. At any rate there seems to be two possibilities, either the agglutination test may give positive results for other things besides undulant fever, or there are many cases of undulant fever in this State that no one knows anything about, and I am afraid that the latter is true. Doctor Stites describes the condition as a "mimic disease" and I think that describes it very well. What few cases I have seen have shown a few rather typical symptoms, but in addition they have presented symptoms typical of other conditions but important things are usually lacking which would enable one to make a diagnosis of other conditions.

Dr. Arlington Ailes, LaSalle: Is it possible, Dr. Houston, that you might have had an epidemic of undulant fever around Industry?

Dr. Houston: That is probable, at least remotely. I think infected herds are perhaps more numerous in some communities than in others and while I think the majority of cases are infected from the milk or infected cattle it is definitely shown that there are other sources of infection. This is borne out by the fact that undulant fever cases among employees of packing houses are not uncommon and I believe that it is in such places that many of the porcine types of infection occur.

There was one other thing bearing on the matter of vaccination which is of interest and which I neglected to mention. I have been informed that approximately 50 per cent. of the veterinarians in this State give positive agglutination tests for undulant fever though very few of them have shown any definite symptoms of the disease. This would certainly indicate that an immunity is possible, and they are indeed in a position to

build active immunity through contact with organisms. This, to me, indicates that active immunity is possible through vaccine therapy and I do not believe that the time is far distant when the results from the use of vaccine will be safe and sure.

Dr. W. W. Kuntz, Barry, Illinois: I should like to ask Dr. Stites if he had any of his positive cases re-checked by the laboratory; and do I understand Dr. McLaughlin that the University of Iowa checked some of their positive cases?

In a case that I suspected might be undulant fever I sent a blood test and got a positive return. Not still quite satisfied it was re-checked with a subsequent test, and one at the National Public Health laboratory. They both came back negative.

Dr. H. J. Shaughnessy: Dr. Houston passed a great deal of the responsibility for the diagnosis of these cases to the laboratory test. I do not think he can be blamed for that because in the words of the writer in the Government Bulletin 158, to which you have already been referred, "undulant fever is an infection having neither a pathognomonic symptom nor sign." In almost every other condition the clinician relies only to a certain extent upon the laboratory test. His clinical findings are usually so well marked that the laboratory diagnosis is only an adjunct to his findings. In this case, however, where he has great difficulty in making a differential diagnosis, the laboratory test is more important than usual. For this reason, something in regard to the significance of the test ought to be mentioned. In the first place, I think we can say that from the technical standpoint we are willing to stand by the test. We have had it performed by two different individuals, reading them separately with good agreement. The work reported here dealing with the cases in the University of Iowa showed that with check tests made between the Iowa State Laboratory and the National Institute of Health, they agreed in practically all cases.

Dr. Houston has raised an important point, I think in asking "What is the significance of a positive test?" and that until some more marked symptom of the disease is known, will probably not be possible to answer. We can say this, I think, at present, however: First, the test may indicate remote infection as well as the present infection. That always is to be remembered. Probably it is not so important because the evidence to date indicates that the agglutination titre in these cases run down very rapidly and does not remain high for more than a year at the most.

Then the test is sometimes negative even when the infection is known to be present by the finding of organisms in the blood stream. That happens, of course, even in typhoid. The Widal test is only ninety per cent. accurate under the best conditions and I do not think we will ever find this test is more accurate than that. Probably it will be less accurate for some time.

Finally, the third question, the possibility that other disease may affect the agglutination test is one that has given us a good deal of worry, and I think we can frankly say that that does happen. We find individuals suffering from febrile conditions due to other causes showing a positive agglutination test, in typhoid fever. That phenomenon has been discovered in our own laboratory and in the New York State laboratories and we find it probably happens in the case of undulant fever. I have recently talked to Dr. Robert Graham, head of the animal pathology division at the University of Illinois, who is doing this test on cattle, and he says that his results indicate that they get a positive agglutination test for undulant fever with other diseases occasionally, so that we must look out for it.

Finally, I would like to say this, that Dr. Stites' cases would indicate in themselves to a certain degree that the test is reliable perhaps in three-fourths of the cases, or something of that kind. You remember that he stated that he had a couple of positives in 1929 and then for sixteen months, when he was not looking for them especially, all of the tests were negative, then when he began to select his cases carefully the percentage of positives became much higher. I do not think it would be possible that anyone could just go out and take blood indiscriminately and show 28 positive cases out of 71 persons examined. We hope at least you will not do that because you will inevitably believe that the laboratory test is not reliable under those conditions.

Dr. R. O. Stites (in closing): I have not checked up on the Laboratory reports. I went to Springfield at 8 A. M. one Sunday morning and called Drs. Huston and Shaughnessy out of bed. By talking to them I personally am sure any check on their work would find them with a "Royal Flush" and not any "Bobtail Straights." I cannot answer any questions concerning this disease. My paper is just a story, not a scientific paper. It is a story grown out of 10 years of dissatisfaction with mystifying results in the practice of medical art.

I sincerely believe undulant fever (the Mimic) is the answer to a vast amount of unfavorable results when I had given a good prognosis and favorable results when I had given a grave prognosis. I will stick to my story.

THE BLOOD CHEMISTRY, TOXEMIA AND MECHANICS OF ADVANCED INTESTINAL OBSTRUCTION, WITH DEDUCTIONS ON TREATMENT*

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Of late years great progress has been made in the scientific study of intestinal obstruction. Research has been chiefly on the changes in blood chemistry, and on the nature and origin of the toxemia observed in certain cases. Study of the mechanics of intestinal occlusion has been

*Read before the Joint Meeting of Illinois State Medical Society, May 5, 1931, at East St. Louis, Ill.

relatively neglected, although this is a factor equal in importance to deranged blood chemistry and toxemia. On this I shall present some personal observations.

Despite the increase in our knowledge of intestinal obstruction, the death rate therefrom, except for cases of brief duration, still remains very high. There is a widespread opinion that, in the management, early diagnosis is about all that matters. This attitude is liable to make the physician take a complacent, and therefore dangerous, attitude toward the fate of late cases. While the importance of early diagnosis is very great, we have to recognize that for a long time to come we must continue to treat advanced cases. I shall therefore try to apply our present scientific knowledge to the management of these, for whom, I think, it offers increased hope of survival.

The limits of a single paper compel me to present my subject in outline form. I cannot review the vast literature or give credit to all the workers, whose painstaking research has built up our knowledge.

1. The Two Kinds of Intestinal Obstruction. Foster and Hausler,[1] and Trusler and the writer,[2] independently arrived at the conclusion that there are two distinct kinds of intestinal obstruction. These are 1. Simple obstruction, in which there is no gangrene of the bowel, and 2. Strangulation, which is obstruction plus gangrene of the bowel.[3] We came to recognize these two groups because experimentally we were unable to produce in the dog an obstruction which would remain for more than a day or two uncomlicated by gangrene, except at a point not far from the pylorus, or in the colon. The technique we used was division of the bowel and invagination of the severed ends. Elsewhere in the small intestine we almost invariably observed the early development of gangrene at the site of obstruction. It is to be noted that we were studying bowel obstruction uncomplicated by interference with the mesenteric circulation.

We therefore studied why gangrene did not occur at or near the pylorus and in the colon, and why it occurred throughout the great length of the small intestine. We found the explanation in the effect upon the circulation of the bowel of distention due to gas or fluid. Suffice it to say that we were able to measure the blood flow through a loop of bowel subjected to various degrees of inflation, and to show that the flow decreases as the distention increases, and ceases when the pressure within the bowel equals the systolic blood pressure. This result has been confirmed and amplified by Dragstedt, Long and Millet,[4] who have shown that distention causes the greatest interference with the circulation of the duodenum, and the least with that of the colon. They explain this, in all probability correctly, as correlated with a variation in the distribution of the blood vessels in the wall of the intestine.

It may be objected that intra-intestinal pressures as great as we used in this experiment do not occur under clinical conditions in the human intestine. The answer to this is that they do, as every surgeon who has performed enterostomy for obstruction can testify. I have often seen the small intestine distended to a diameter of two inches or more and almost white in color. On releasing the pressure I have always observed that the bowel took on a bright red color. In this connection it is of interest to note that Kocher[5] in 1898 observed ulceration and perforation of distended loops of bowel at the mesenteric border.

In the effect of distention on the circulation of the bowel we therefore had the explanation of why, in our experiments, simple obstruction occurred at or near the pylorus and in the colon, and why strangulation occurred in the small bowel. At or near the pylorus the distention is relieved by regurgitation into the stomach. In the colon the distention is well tolerated by the ability of the colon to expand, by its power to absorb water, and by its blood supply, which is not so much impeded by distention. In the jejunum and ileum, however, because of the trapping of the fluid or gas, the distention quickly leads to gangrene.

It is important to note that the foregoing conclusions hold good for obstruction due to a localized peritonitis involving a portion of the intestine.

This associated with distention of the bowel, may cause a complete obstruction. In fact this is probably the commonest cause of intestinal obstruction. If the terminal ileum is so af-

3. Wilkie deserves credit for first making this classification (1913) though his conclusions remained unheeded.

fected, as it often is in advanced appendicitis, it is totally paralyzed and will be distended gradually by gas and fluid. The distention will spread till more and more intestine is involved. Gangrene of the bowel and general peritonitis then ensue. We shall return to this matter later.

So far we have shown that there are two kinds of advanced intestinal obstruction depending upon the presence or absence of gangrene of the bowel. We have pointed out that in the experimental animal obstruction produced without interference with the blood supply of the bowel will remain uncomplicated by gangrene (simple obstruction) in two places only, namely, at or near the pylorus, and in the colon. We have accounted for this localization of simple obstruction as observed in our experiments, by the absence of the effect of distention on the circulation of the bowel wall. Clinical observation shows that this distribution of advanced simple obstruction is found also in man.

Certain corollaries to this conclusion should be pointed out. Simple advanced ileus, the sigmoid excepted, occurs chiefly in portions of intestine devoid of a mesentery. It is caused clinically almost entirely by obstruction from ulcer or cancer. These conditions are practically limited to the duodenum, pylorus and colon. Portions of bowel devoid of a mesentery are not liable to interference with their extramural blood supply, since they are not affected by the two chief causes of such interference, volvulus and incarceration. Distention of the small bowel may cause gangrene of the bowel above the site of any obstruction, no matter how produced. It is evident that all early obstructions are simple, also that the dangers of strangulation are equal to those of simple obstruction plus the additional dangers due to the gangrene.

A failure to recognize the fact that there are two kinds of intestinal obstruction, has led to endless confusion of thought, great waste of effort in experimental study, and poor clinical results.

THE SYSTEMIC EFFECTS AND BLOOD CHEMISTRY OF INTESTINAL OBSTRUCTION

The systemic effects of intestinal obstruction have till recently been attributed by nearly all observers to toxemia. Within the last few years, however, overwhelming evidence has been produced by many observers to show that in simple high obstruction, and by this I mean obstruction at or near the pylorus, death is due to a metabolic disturbance. Since the establishment of this fact marks a great advance in our knowledge of intestinal obstruction, I shall briefly review its history.

Hartwell, Hoguet and Beckman[6] in 1912 were first to call attention to the beneficial effects of salt solution in intestinal obstruction. They attributed this action to the relief of dehydration. McCallum[7] in 1920 explained the relation of pyloric obstruction to gastric tetany. He was first to show that in pyloric obstruction there is an alkalosis due to loss of chlorine ions. In 1923 Haden and Orr[8] attributed the beneficial results of salt solution to a neutralization of a hypothelical toxine by chlorine ions. These writers now admit that this neutralization theory is untenable. It had, however, the great merit of stimulating much experimental work, which has finally led to a complete demonstration that there is no absorption of a toxine in high simple obstruction, and that the causes of death therefrom are dehydration, alkalosis and starvation.

The writer and Dr. H. M. Trusler[9] showed that the fall in body chlorides can be accounted for by the chlorides lost by vomiting, in the urine and in the intestinal contents. Brooks[10] showed that sodium chloride was powerless to prevent the effects of the toxin obtained from obstructed loops of bowel. Foster and Hausler[1] demonstrated that a dog with simple obstruction can be kept alive for weeks without either water or food if he is tided over the critical period immediately after operation by the administration of salt solution.

White and Fender[11] showed that a dog with high obstruction can be kept alive and in good condition indefinitely if his vomitus is collected and injected into the bowel below the obstruction. This result is inconceivable on the assumption that the vomitus is toxic.

The Blood Chemistry. The changes in blood chemistry which are found in high simple intestinal obstruction may be summarized as follows:

1. There is a fall in the blood chlorides which causes an alkalosis. When the chloride level reaches 300 mgm. tetany is liable to develop. The fall in the chlorides is due to the loss of

chlorine ions into the gastro-intestinal tract. The basic ions (sodium) remain in the blood and produce an alkalosis as shown by the increased carbon-dioxide combining power of the blood. McIver and Gamble,[12] while stating that an alkalosis is the usual finding, point out that in some cases an acidosis is met with. This occurs when there is a preponderance of bile and pancreatic secretion in the vomitus. In the gastric juice the acid ions are to a great degree not bound to fixed basic ions. A constant loss from the body of gastric juice, therefore depletes the blood of acid ions. In the bile and pancreatic juice, on the contrary, the acid ions are for the most part bound to fixed basic ions (chiefly sodium). Loss of this secretion, therefore, causes an acidosis. It is evident that with obstruction above the ampulla of Vater, alkalosis will occur, unless there is achlorhydria.

2. There is marked dehydration, caused essentially by the loss of electrolytes from the blood. It is a matter of great importance to note that this dehydration cannot be relieved by giving water alone. Sodium chloride must be given with the water before the body can retain the water. We have shown that dogs with high obstruction die much sooner when given water freely than when deprived of it.

Dehydration causes a marked concentration of the blood, with a great increase in its viscosity. This evidently interferes with the ability of the blood to carry food and oxygen to the tissues, and to remove waste products from them.

3. There is an increase of nitrogenous waste products in the blood. Trusler and I[9] have shown that this increase does not occur if the experimental animal is given adequate quantities of salt solution. This maintains a normal excretion of urine whereby the nitrogenous wastes are eliminated. It is probable that with alkalosis and dehydration there is a breaking down of tissue, which augments the quantity of these waste products in the blood. But there is no reason to think that they are caused by the absorption of a toxin. The same changes in blood chemistry can be observed after the vomiting caused by ligation of both ureters. It is stated that they occur also after profuse and prolonged sweating. In the second location of simple obstruction, namely the colon, no noteworthy changes in blood chemistry occur. This is because vomiting is not severe, and because the colon can easily absorb water from its contents.

The blood chemistry in cases of intestinal strangulation differs but little from that observed in cases of simple obstruction, except that, because of the brief duration of life, the changes are likely to be less marked. Either an alkalosis or an acidosis may be observed depending upon whether the fluid lost into the bowel or by vomiting is predominately of gastric or of duodenal origin. In either case there is dehydration and retention of nitrogenous waste products.

THE TOXEMIA OF INTESTINAL STRANGULATION

Many observers have shown that the stagnant contents of obstructed bowel are strongly toxic. We must consider the origin of this toxicity, the nature of the toxin or toxines found, and the conditions of their absorption.

On the origin of the toxines there have been three theories: 1. That they are produced by a perverted activity of the intestinal epithelium, 2. That they are formed by the action of ferments, chiefly pancreatic, on proteins present in the bowel, 3. That they are products of bacterial action in the stagnant bowel contents. A detailed discussion of these theories would lead us too far afield. Suffice it to say that the majority of writers believe that the third theory has been established by the work of Murphy and Brooks[10] and of Dragstedt, Moorehead and Burcky.[14] The latter workers showed that when an isolated open loop of jejunum has become sterile by prolonged drainage into the peritoneal cavity, it may be closed, and will then cause no toxic symptoms, even though it became gangrenous.

We have but little knowledge of the chemical nature of this toxic material. Brooks[10] with much reason believes that its composition varies with the bacterial flora and bowel content. Dragstedt,[13] thinks it is a product of the action of intestinal bacteria on proteins or their split products. Other writers think it may be composed of histamine-like substances. Injected intravenously or intra-peritoneally the toxic material obtained from obstructed loops causes vomiting, bloody diarrhea, muscular weakness, circulatory collapse and death. The suggestion that the toxemia of ileus is due to the toxines of the Welch bacillus[14]

has been disproved. No one has been able to produce an immunity to the toxic material.

The Absorption of the Toxic Material. This is a matter of even greater importance than the formation of the poison or its chemical nature. It has been generally assumed that absorption is by way of the mesenteric lymph or blood vessels, though some writers have discussed the possibility of transperitoneal absorption. I became interested in this matter while studying the effects of distention on the bowel wall, and performed the following experiments.

A ligature is tied about the small intestine, and at a point one to two feet from this ligature the bowel is cut across and a glass canula is introduced and tied in place so that a segment of bowel is isolated between the canula and the ligature. The canula is connected with a pressure apparatus. The blood pressure is recorded. With the segment of bowel outside the abdomen the pressure within it is now elevated till it equals the systolic pressure of the animal. As we have already explained this produces a complete anemia of the bowel. We now introduce into the bowel a large dose of nicotine or potassium cyanide. Next we gradually lower the pressure within the bowel. There is no sign of absorption of the poison till the pressure reaches about half the systolic blood pressure. At this degree of pressure there is a rapid absorption of the poison, clearly shown by a sudden and great elevation of blood pressure, if nicotine is used, and by a great increase in respiration if potassium cyanide is used. If now the same experiment is repeated except that the bowel, distended to the height of the systolic pressure, is replaced within the abdomen, the animal shows immediate signs of absorption. Thus while distention of the bowel prevents or diminishes direct absorption into the blood stream, it probably increases absorption by way of the peritoneum, because diffusion can take place more readily through a thin and damaged bowel wall than through a bowel wall uninjured and of normal thickness. By this method it can be shown that absorption from the intestine varies inversely as distention of the intestine, or, stated in other terms, the absorption decreases as the circulation through the bowel decreases, till with the onset of gangrene all absorption must be transperitoneal. From an incarcerated loop or from any loop, the mesenteric vessels of which are obstructed, the absorption must be transperitoneal from the very onset, because here the mesenteric veins of the loop are obstructed very soon. From the free bowel above the site of obstruction the absorption by way of the mesentery will decrease as the distention of the bowel increases. Since observers are pretty well agreed that the toxines from the obstructed bowel are but slowly absorbed through an intact mucosa, and since injury of the mucosa does not occur till a rather high degree of distention has been reached, which would interfere with the circulation of the bowel wall, it follows that the chief route of absorption must be transperitoneal and that the chief absorption of toxines in intestinal obstruction occurs rather late in the course of the disease, after well marked distention of the bowel has occurred.

It may be objected that the toxic material formed in intestinal obstruction might not pass through the bowel as does nicotine or potassium iodide. Stone and Firor,[15] however, have shown that when the contents of obstructed bowel are placed in a closed loop of intestine and the latter inflated with air and placed in Ringer's solution, the toxic material can be demonstrated in the Ringer's solution.

There is a widespread opinion that when an obstruction is relieved the patient may be killed by the absorption of toxic material entering the collapsed bowel from above. This idea is supported by the observation of death, apparently due to toxemia, soon after the relief of the obstruction. Now absorption of toxines through an intact intestinal mucosa is slight. We have just shown that with the decrease in the pressure of a distended bowel, absorption through its mesenteric vessels can occur. Therefore, any absorption of toxines, other than transperitoneal absorption, occurring after the relief of obstruction, must be from the bowel above the site of obstruction. I believe that the foregoing experiments show that there is danger from the too sudden relief of intra-intestinal pressure above an obstruction, and think that I have seen clinical proof of this. It is of interest to note that Murphy[10] advocated resection of all damaged bowel to prevent absorption of toxines.

TREATMENT

From the foregoing discussion it is evident that the treatment of simple obstruction is ex-

tremely hopeful even in late cases and comparatively easy, and that the treatment of strangulation of the bowel is the reverse. Both types of obstruction produce a profound systemic disturbance. This, in the case of simple obstruction, is due to a deranged metabolism, plus a profound toxemia. In the treatment of simple obstruction we can correct the faulty metabolism and then relieve the obstruction safely, and even wait in many cases till we see fit to do so. In the treatment of strangulation the correction of the faulty metabolism constitutes but a small part of the cure. Here it is well to state that every patient with intestinal obstruction, or who is suspected of having intestinal obstruction, should be given normal salt solution intravenously to restore his blood chlorides to a normal level, and to relieve dehydration, before he is subjected to any operation. In the following discussion this treatment will be taken for granted.

The Treatment of Simple Obstruction. For clinical purposes this will include the treatment of pyloric obstruction, most cases of obstruction of the colon, and obstruction of the small intestine of less than twelve hours duration. Let us consider these separately.

Prolonged Pyloric Obstruction. If the patient suffering from pyloric obstruction is in the late stages of starvation his tissues will not heal and he may die in from five to ten days of leakage through the suture line, despite efforts to feed him by the intravenous administration of glucose, or by any other method. A patient with a tremendously dilated and atonic stomach may not do well after gastro-enterostomy due to inability of the stomach to empty its contents through the stoma. Patients with either of these conditions are, in my opinion, most safely treated by a preliminary Witzel jejunostomy for feeding or by this combined with gastro-enterostomy if conditions permit.

Advanced Colonic Obstruction. In the presence of colonic obstruction all authorities are agreed that a preliminary enterostomy is the safest treatment.

Obstruction of the Small Intestine of Less than Twelve Hours Duration. Although this is not within the scope of the present paper, it may not be amiss to mention it.

Here the question of diagnosis is often a matter of great difficulty and importance. Waiting till a certain diagnosis can be made is a frequent cause of death. I deem it the safest rule to operate at once upon a patient in the class under consideration if his symptoms make it reasonably probable that he has an obstruction. If this is done, simple relief of the obstruction is usually all that is necessary.

Obstruction Due to Localized Peritonitis. In this group are those patients, who following operation for gangrenous appendicitis or appendix abscess, develop regurgitant vomiting. In the past we have treated them by gastric lavage, the intravenous administration of salt solution and glucose, etc., and have watched them slowly develop what we called general peritonitis. If at the first sign of regurgitant vomiting, and at a time when borborygmi can still be heard, a high Witzel enterostomy be done, the patient can frequently be saved. The trouble here is intestinal obstruction due to peritonitis and distention involving the cecum and terminal ileum.* The intestine above this is perfectly healthy at first, but it is rapidly injured by distention. The patient finally dies of general peritonitis if the obstruction is not relieved, caused either by rupture or gangrene of the bowel. It is essential to do the enterostomy early and before the bowel has lost the power to propel its contents. It is of no value in general peritonitis.

In a series of one hundred consecutive cases of gangrenous appendicitis most of which were complicated by abscess, and in all of which drainage was necessary, we performed Witzel enterostemies on six patients. The benefits of the operation were striking. I cite this series of cases to show how frequently intestinal obstruction complicates the post-operative course of late appendicitis.

The Treatment of Intestinal Strangulation. This has been one of the most discouraging problems of surgery. The treatment is not, however,

*Alvarez and Hosoi[6] (Amer. Jour. of Surg. VI No. 5, pp. 569-577) discuss the effect of peritonitis on peristalsis and quote Hotz (Hotz G. Betrage zur. Pathologie der Darmbewgenngen. Mitt. A. d. Gremzgeb d. Med. U. Chir. 20. 257-318, 1909) as authority for the conclusion "that injury to the muscle in peritonitis is due not to toxines but to distention by gas." Handley (Brit. Jr. Surg. Vol. XII, p. 417. Jan. 1925) holds that a localized peritonitis involving a segment of bowel produces a mechanical ileus above the inflamed segment.

entirely hopeless. My main reasons for this attitude are three:

1. That I believe the absorption of toxines from the gangrenous or semi-gangrenous bowel is chiefly transperitoneal. This route of absorption gives the body a better chance to build a barrier against the systemic invasion of the poison than would be the case if the absorption were by way of the mesenteric vessels. In addition to the experimental evidence for this method of absorption, I have the clinical evidence, obtained from four patients, of the total walling off of a loop of bowel, which from the history and the appearances noted at operation must have been gangrenous for two days or more.

2. The second reason is that the chief absorption of toxines from a strangulated bowel occurs rather late in the progress of the disease. This I have already discussed.

3. The third reason is that the intestine has a truly remarkable power to recover from apparently advanced states of strangulation. This is shown by common experience with loops of bowel incarcerated in hernias.

But, despite the foregoing considerations, the treatment of advanced ileus presents difficulties of a disheartening character. There is a well-defined limit at which a cure is impossible and should not be attempted. This represents the stage at which a lethal dose of toxine has been absorbed, and is indicated clinically by a change in the patient's mental attitude and the failure of his circulation. As long as the patient is mentally clear, has an intact circulation and some peristaltic activity his cure is at least possible. It is well to picture the abdominal condition we have to correct. At the site of obstruction there may be an incarcerated and gangrenous loop of bowel or a loop bound down by an adhesion, or a stretch of bowel involved by local peritonitis—to mention the more common possibilities. Above the site of obstruction the bowel is thin and distended with toxic fluid which is passing by diffusion into the peritoneal cavity. In addition to this the general condition of the patient is precarious.

There are, of course, two methods of operation, the indirect, consisting of the relief of the obstruction by enterostomy, the site of the obstruction being ignored, and the direct, in which the site of the obstruction is searched for and the cause removed.

The indirect method carried out by means of a Witzel enterostomy has the great merit of avoiding the dangers of severe operative trauma and general anesthesia. It will relieve the distention if the bowel proximal to the obstruction is still viable. The method has the theoretical advantage of deflating the bowel slowly. The main objection urged against it is that it leaves untouched the seat of the obstruction, where there may be gangrenous bowel. But in the advanced case of obstruction the risk of leaving a gangrenous loop of bowel is less than the risk of general anesthesia and a major operation. For reasons I have already given we are justified in placing some confidence in the ability of the body to wall off for a time a gangrenous piece of bowel. After the relief of distention by the enterostomy there may still be the opportunity to deal directly with the obstruction at a time when the patient is in better condition.

We therefore deem enterostomy the method of choice for treating all advanced cases of small bowel obstruction. It is the only method to be considered when the obstruction is due to localized peritonitis from any cause. Operation directed at the location of the obstruction in this case can do nothing but harm—since it will spread the infection and not relieve the obstruction.

If the trouble is not due to a local peritonitis, and if the patient is still in condition to take a general anesthetic and to undergo a brief operation, the direct method is best. Especially is this true if the location of the obstruction is fairly well known. The surgeon should be content to stop when he has relieved the obstruction. In the performance of the operation the dilated loops should be restrained with great care and not be allowed to escape from the abdomen. Collapsed bowel should be found and traced to the site of obstruction. If the bowel at this point is gangrenous it should be doubly clamped on each side of the gangrenous piece and the latter carefully removed. Intestinal anastomosis should never be done. The cut ends of bowel should be brought out of the wound as a gunbarrel

enterostomy, and the wound closed about them. I have so treated six patients with gangrene of the bowel with three final recoveries, and five recoveries from the obstruction. If the bowel is not gangrenous, the cause of the obstruction should be removed and a Witzel enterostomy done. I disapprove of short circuiting operations to relieve the obstruction, because of the operative trauma involved, because of the risk of suture done on dilated bowel, and because of the ill effects of the operation in case the patient recovers.

The Use of Spinal Anesthesia in Intestinal Obstruction. Lack of time prevents a complete discussion of this topic. I know of three deaths on the table following spinal anesthesia induced to relieve intestinal obstruction. A patient with advanced obstruction has a low blood pressure, a crippled heart action and impaired respiration. As David[18] has remarked, "to still further lower the blood pressure, or in some instances to interfere with respiration (by Spinal Anesthesia) is a somewhat heroic procedure." Spinal anesthesia was first suggested by Wagner[19] in 1922 to distinguish between paralytic ileus and ileus due to mechanical causes. It is not to be relied upon for this purpose. Ochsner[20] and David,[7] regarding spinal anesthesia as too dangerous, have studied the effects of splanchnic anesthesia. David concludes that the method can be of but little use in the treatment of paralytic ileus due to peritonitis, and that it is unreasonable to believe that it can cure a mechanical obstruction.

Diagnosis of Advanced Ileus. The diagnosis of the presence of advanced intestinal obstruction is not so difficult as that of early obstruction. Advanced simple obstruction in the great majority of cases is limited to a point at or near the pylorus, and to the colon. Clinically we may regard any case of obstruction at either of these locations as advanced, when there is a total blockage of the lumen of the bowel. At or near the pylorus the clinical history, the character of the vomitus and the physical findings are usually sufficient to make the diagnosis. In the colon the location can usually be found by the use of a barium enema.

For clinical purposes any small bowel obstruction should be regarded as advanced from the time fecal vomiting is first observed. This indicates that a distention of the bowel has occurred sufficiently great to endanger its vitality and to make possible the absorption of toxic material. I have found that a flat, x-ray picture of the abdomen is of great value in determining the probable level of the obstruction and the degree of intestinal distention. From a study of this and of the general condition of the patient I decide whether to use the direct or the indirect method of operation.

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Hume-Mansur Building.

NEEDLESS ARM INJURIES*

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The danger connected with lesser injuries to the nerves of the shoulder has apparently gone unrecognized. A little child may risk serious future disability when a parent or some adult admirer, to the child's delight, picks him up by the arms and swings him around. Often no harm is done but if it should happen that the child's arm, either immediately or a little later, should become limp and useless, the trivial circumstance which has caused the disability may have been completely forgotten.

Cases of partial or even permanent disability which have resulted from minor causes have not found their way into the literature as have the more spectacular and manifest brachial palsies due to gun shot wounds, falls on the shoulder or difficult obstetrical deliveries. Yet just such injuries as those resulting from playful swinging are only too frequent in the experience of the general practitioner and the pediatrician. The surgeon sees them less often and it is an unfortunate fact that it is most often the late results rather than the early manifestations of such slight injuries which come to his care. If the potentiality of a complete paralysis even where there is no evident lesion were realized these cases would come earlier to treatment or better still the circumstances causing the injuries would be avoided.

It is easy to understand the liability to damage of the nerves supplying the arm, especially in the case of little children. The anatomical scheme of the parts involved illustrated by the drawing sketched from Deaver's Surgical Anatomy, shows a comparatively superficial position of the important cords and an interesting winding of blood vessels about the peripheral nerves. A brachial palsy results from the overstretching or the division of one or more of the component parts of the plexus, and an intra-neural or extra-neural hemorrhage may be responsible for additional pressure symptoms.

The mechanism of damage to the brachial plexus has been the subject of numerous studies in connection with birth palsies and similar injuries in later life. Duchenne[1] and Erb[2] working sixty years ago demonstrated that severe birth palsy was caused by a rupture of the fourth, fifth and sixth cervical roots of the brachial plexus and the term "Duchenne-Erb type of paralysis" remains as a permanent recognition of the painstaking dissections of these two men. Schultz[3] in 1908 collected fifty-four shoulder dislocations in seventy-five per cent of which brachial palsy developed in varying degrees. Delbet and Chauchoix[4] in 1910 reported thirty-five autopsies in which no rupture of roots was seen. From five operative cases in 1913 Taylor and Casamajor[5] obtained poor results. They concluded that the structures in order of injury were the cervical fascia, nerve sheaths, nerves, and lastly the blood vessels, and that the scar tissue resulting had much to do with the permanent paralysis. Taylor[6] in 1920 states his belief that the essential lesion is not damage of the shoulder capsule but rather a true nerve lesion, including torn fascia, torn muscle, torn nerve sheath and torn nerve, all infiltrated with blood from the torn vessels. He points out that as time passes a hard cicatrix binds all these structures together and forms an impassable barrier to regenerating nerve and to nerve impulses. About the same time Thomas[7] applied forceps forcefully to still born babies, but in no instance was able to rupture the roots or the plexus. Adson[8] in 1922 quotes two views with reference to brachial palsy; in immediate paralysis the lesion was primarily brachial; in subsequent paralysis the lesion concerned the joint. Reviewing the literature on obstetric paralysis Adson finds that the fifth and sixth roots are the ones most frequently involved, that there is rarely a laceration of nerve structure and that the scar several months after injury makes operative relief difficult. His own observations on 101 brachial injuries at the Mayo Clinic led him to the conclusion that the mode of treatment depends on the cause and the degree of the injury.

Realizing the difficulties of determining the exact extent of brachial damage following strain and knowing the importance of early treatment, the wise pediatrician seeks immediate surgical advice while there is yet time to immobilize for the combined purpose of maintaining that position of rest which will protect injured muscles and nerves and limiting that degree of hemor-

*From the Department of Surgery, Evanston Hospital, April, 1931.

rhage the pressure of which is probably responsible for many cases of paralysis. A recent typical case concerned a young child in apparently excellent general health but with an arm which was seen on examination to be flail, useless and dangling at the side. There seemed to be little if any pain and there was no particular outward manifestation of suffering except the inability to move the arm. On gentle abduction however the child complained of rather marked axillary pain. There was no evidence of fracture. Treatment in this case was conservative and quickly effective. The arm was placed on a pad in slight

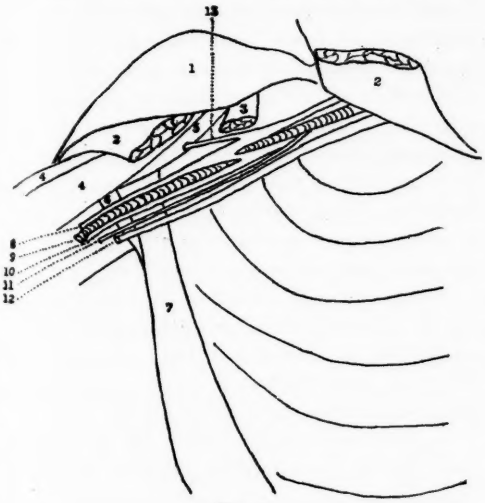

Fig. 1.

1. Deltoid muscle
2. Pectoralis major muscle
3. Pectoralis minor muscle
4. Biceps muscle (boths heads)
5. Coraco - brachialis muscle
6. Teres major muscle
7. Latissimus dorsi muscle
8. Median nerve
9. Axillary artery
10. Ulnar nerve
11. Musculo-spiral nerve
12. Axillary vein
13. Musculo-cutaneous nerve

abduction and was immobilized to the chest wall with the elbow in acute flexion. In twenty-four hours sensation began to return and slight motion was observed in the fingers. Under the treatment of immobilization both sensory and motor functions returned and were complete in ten days. With the arm restored to normal use the danger of future disability is in all liklihood averted. This instance of brachial injury is one among several in the experience of the writer many of which show no such fortunate recovery. It is intended to illustrate the danger of the injury, the importance of avoiding this sort of well intentioned but risky play and the advantage of well directed early treatment.

Preventive surgery thus plays the leading role in trivial brachial injuries. The proper abduction immobilization should be calculated to reduce and favor the absorption of hemorrhage and extravasation of serum which otherwise might exert sufficient pressure to cause or to prolong a serious palsy. It may in addition serve to prevent the pressure scars which are frequently observed in operative cases and which so often disturb brachial function. Yet preventive surgery, successful though it may be, is a poor substitute for prevention of initial injury. If potential disability is the price of the fun of swinging a youngster by the arm in a rotary fashion surely the danger need only be recognized to be avoided.

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THE SYMPTOMS AND TREATMENT OF PYELITIS

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In the last three years I have treated about thirty-five patients with acute or chronic pyelitis. A review of their histories discloses some rather interesting facts concerning the symptomatology and treatment. It must be admitted that these patients represent the most severe cases of pyelitis seen by the referring physicians. The more numerous, milder cases probably re-

sponded to simpler methods of treatment. Most of these patients were very ill upon admission to the hospital, having been sick for from several days to several weeks.

The diagnosis of acute pyelitis is usually not difficult, though the condition is often overlooked unless a careful history is taken, a thorough physical examination is made and the urine is examined microscopically. In acute pyelitis, the onset of pain in the upper lumbar region is often abrupt, and it frequently radiates down the course of the ureter to the suprapubic region. The ureteral symptoms may be so severe that the presence of a ureteral calculus is strongly suspected. I believe that ureteral colic in these patients is usually caused by an acute ureteritis. In its absence and where there is no other obstructive lesion, there may be surprisingly little pain in acute pyelitis.

Tenderness over the kidney is a more constant symptom, and is present in every case to a greater or less extent. It is best demonstrated by having the patient sit or stand with his back to the examiner, who places his thumbs in the right and left costovertebral angles, just outside of the erector spinae group of muscles. Equal, moderate pressure with both thumbs will elicit tenderness on the affected side. Later, with the patient lying relaxed on his back, each kidney region may be compressed with one hand in front and the other behind. This test is not so accurate as the foregoing as tenderness in the spleen, gall bladder or bowel may lead to confusion. There may also be tenderness along the ureter of the affected side, but this can easily be mistaken for intestinal and appendiceal lesions. In severe cases, especially where there is ureteral obstruction, there may be rigidity of the abdominal muscles in the upper quadrant, which may lead one to suspect a renal tumor or hydronephrosis.

Fever, with, or without chills, is the third important symptom which makes one suspect pyelitis. The temperature is usually not very high, varying between 101 and 103, although in those patients having chills, it often reaches 104 and in one patient who recovered, it reached 108 after a chill. Between chills the temperature often falls to nearly normal. As a rule the patients look and feel sicker than their fever would indicate.

Bladder symptoms are often entirely absent, and when present are usually not severe unless the acute pyelitis was preceded by a cystitis; or unless a chronic or recurrent pyelitis has previously infected the bladder.

Urinalysis is obviously essential to the diagnosis, and should be made on the second glass in the male and on a catheterized specimen in the female. Usually centrifuging is not essential, though it is preferable in every case. The sediment or a drop of the uncentrifuged urine should be examined first with the low and then with the high power lens, and search should be made for pus, blood, bacteria and casts. It is also well to stain the sediment to determine the offending microorganism. In the average case of uncomplicated pyelitis, there is only a moderate amount of pus, with or without blood and bacteria. When cystitis is also present, there is a large number of pus cells and usually many bacteria, and few or many red blood cells.

Cystoscopy with catheterization of the ureter on the affected side is the final step in the diagnosis, and the first step in the treatment. Usually I do not introduce a catheter into the normal renal pelvis, for fear of infecting it.

A specimen is obtained from the diseased kidney, and a phenolsulphonphthalein test is performed and an x-ray is taken to rule out renal stone. In selected cases, a pyelogram is also made, though I prefer to wait until the acute symptoms have subsided before attempting pyelography. It seldom gives very much assistance in the diagnosis of acute pyelitis, and may lead to confusion because of incomplete filling due to spasticity and renal irritability.

Treatment. The most important step in treatment of any infected organ is to obtain free drainage. Therefore, I make it a practice in all acute cases to leave the ureteral catheter in place for from twenty-four to thirty-six hours. The purulent urine escapes easily through the catheter and the inflamed kidney pelvis and ureter are put at rest. I also lavage the pelvis of the kidney thoroughly and instruct the nurse to inject into the catheter from four to ten cubic centimeters of warm, 1:200 mercurochrome solution, every hour. She first aspirates all of the

urine and then injects slowly the required amount of solution stopping if any pain is caused. These injections keep the catheter open, and the mercurochrome helps to overcome the infection. Usually the temperature falls to normal under this treatment, but a second or third cystoscopy may be necessary in rebellious cases.

Of almost equal importance in the treatment is an adequate fluid intake. It is essential to push fluids vigorously and if the patient cannot take enough water by mouth, it should be administered subcutaneously or intravenously in the form of normal saline and glucose. Liquid diet is preferable, and in the uremic or preuremic patients, it should contain very little protein and salt.

The bowels should receive careful attention, as most of these patients are distended and constipated. Alum enemas and laxatives such as magnesium citrate are usually successful in controlling these symptoms.

In patients in whom for any reason ureteral catheterization cannot be performed, I use intravenous medication. I have found mercurochrome 220 soluble in doses of ten cubic centimeters of a one per cent. solution disolved in 50 per cent. glucose very valuable and reactions have been rare. Metaphen is less efficient, but is entirely free from reaction, and may be tried if one is afraid of mercurochrome. If these measures fail, and ureteral catheterization is still impossible, and if the patient continues desperately ill, pyelotomy with the insertion of a drainage tube into the pelvis of the kidney is our last resort.

Oral medication has not been mentioned, for the severe cases of pyelitis which we see in hospital practice have almost all received several different urinary antiseptics, without avail. I seldom use them in very acute cases, but in subacute and chronic cases, they seem to do good. I have used methenamine, hexylresorcinol, and pyridium, but prefer neutral acriflavine. It is not expensive, and never causes gastro-intestinal or other toxic symptoms, and I have been well pleased with the results. I have found it worthless in cystitis, and in many cases of pyelitis it does no good.

Other therapeutic measures which are of utmost importance in prevention of recurrences are removal of focal infection and ureteral dilation. Treatment of sources of infection in the lower genito-urinary tract such as chronic prostatitis, urethral stricture, cystocele and endocervicitis is also very necessary in the prevention of further attacks. In the period of convalescence, generalized ultraviolet light irradiation and iron and arsenic tonics are valuable in helping the patient to regain his health.

The treatment of chronic pyelitis differs somewhat from the above regime. For pelvic lavage in these cases I use two or three cubic centimeters of two per cent. silver nitrate, and leave the catheter in only long enough for the cloudy urine to drain out through it. Pyelography is more essential for the complete understanding of chronic pyelitis, and ureteral dilation is more necessary in its treatment.

The results of treatment in my series of cases have been very good, though some patients have had to return from time to time for bladder irrigations and occasionally for pelvic lavage. I failed to give permanent relief in one patient with ureteral strictures, despite repeated dilation. Also a pyelitis of pregnancy complicated by hyperemesis gravidarum was so resistant to treatment that therapeutic abortion was required. All of the other patients except the most recent ones are now free from urinary symptoms, and when last seen had clear urines.

SUMMARY

The cardinal symptoms of acute pyelitis are renal pain and tenderness, fever, with or without chills, and pyuria. Chronic cases usually have little or no fever, except during acute exacerbations. Frequent and painful urination are present only if there is a complicating cystitis. Neutral acriflavine is perhaps the best oral urinary antiseptic.

Cystoscopy should be performed if oral medication does not result in prompt improvement, and a catheter should be introduced into the affected renal pelvis. In acute cases the pelvis is lavaged with 1:200 mercurochrome, and in chronic cases with 2 per cent. silver nitrate. If cystoscopy is unsuccessful, and the patient continues very ill, mercurochrome or metaphen administered intravenously is often helpful. If these fail, pyelotomy should be performed.

DIAGNOSIS OF SPINAL CORD LESIONS*

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The focal lesions of the spinal cord that may require surgical treatment may be grouped under the following headings:

1. Tumors.
2. Fractures or dislocations.
3. Inflammatory processes, local or diffuse.
4. So-called myelitic lesions.
5. Congenital lesions.

I shall confine my remarks today to the tumors, so-called myelitic lesions, and the inflammatory processes. If time permits, I may say a few words about the traumatic conditions.

In order to make the diagnosis and localization in a spinal lesion, we make use of the following symptoms and tests:

1. Paralyses, either spastic or flaccid, of the muscles.
2. Changes in reflexes.
3. Sensory disturbances.
4. Lumbar puncture and Quackenstedt test
5. Bladder examination with Rose's cystometer.
6. X-ray.
7. Special examinations, such as lipiodol or air injections.
8. Vaso-motor disturbances.

Let me say at the very outset that, though a careful history always must precede the examination, it is of far less importance or help in a spinal case than in an intracranial case. The one point of great importance in a spinal case is whether the symptoms have come on suddenly or gradually. Though the symptoms in spinal tumors may come on suddenly, it is very unusual for them to do so. One striking exception to this rule is involvement of the bladder; in two cases I have had of tumors of the filum terminale, which were published last year, the patient's first symptom in each case was acute retention of urine. These two patients sought a urologist and, fortunately for them, fell into the hands of Dr. D. K. Rose, the inventor of the cystometer. He immediately recognized that the bladder disturbance was due to a central nervous lesion and not to any disturbance in the bladder or prostate. I have seen a number of patients with cord tumors who were treated for a supposed enlarged prostate and one man, a brother of a doctor, had his prostate removed by his doctor brother without relief of his urinary symptoms. Only after his spinal tumor had been removed were the bladder symptoms relieved.

Our problem is to determine the level of a lesion in the cord. Let us see how the eight tests I have referred to enable one to determine this.

1. The paralyses of muscles. If the cord is so markedly compressed that all function is lost below the level of compression, the muscles will be spastic, sometimes so much so that they are like bands of iron and joints can only be flexed or extended with the greatest difficulty. At the level of the lesion the muscles may be flaccid, due to the fact that the peripheral neurone, or part of it, is out of function. But, with one exception, the condition of the muscles does not give one exact information as to the level of the segment involved. The one exception is the presence of what is known as Beevor's sign, an invaluable but much neglected test. When a lesion is located at the level of the ninth or tenth dorsal spinal segment, the lower portion of the rectus muscles may be paralyzed, consequently when the patient is directed to raise his head from the bed the umbilicus moves up, pulled up by the upper part of the rectus which is intact. The umbilicus may move up an inch or two. This constitutes Beevor's sign. Normally, if the upper and lower portions of the rectus are intact, when the patient flexes his head the umbilicus remains stationary though it may be retracted. Of course, the test must be carried out with the patient lying flat on his back. A positive Beevor's sign gives one as accurate a level diagnosis as any sensory disturbance.

2. The reflexes below a compression lesion of the cord are increased, the patient is spastic and all the pathological reflexes may be observed —ankle and patellar clonus, Oppenheim and Babinski. If the lesion happens to be at a segment of the cord through which a reflex arc passes, one may note increased reflexes below the lesion, one or more absent reflexes at the level of the lesion, and normal reflexes above the

*Read before the Joint Meeting of the Illinois State Medical Society, May 5, 1931.

lesion. It is only in lesions of the cervical or lumbar cord that such differentiation by means of reflexes is possible. I have seen a number of cases where the exact segment could be determined because the biceps reflex was present and the triceps reflex was absent.

3. The most valuable test, however, of a focal lesion still remains the sensory examination. But there are sensory and sensory examinations and I find that mistakes frequently occur because some of the simplest and most fundamental precautions are neglected.

First, a sensory examination to be of value should be done in a quiet, warm room. When relative changes in sensation are being examined for, the patient's undivided attention is necessary and therefore he must not be distracted. When a patient is totally anesthetic below a certain point, of course, such a precaution is not so necessary. Second, the temperature of the room is also important as patients cannot discriminate so well if they are cold. Third, the patient must be stripped and uncovered as the weight of the bed clothes may distract him and influence his answers.

Sensory examinations are ordinarily made with cotton-wool, a sharp pin, and hot and cold test tubes, but occasionally one's ingenuity is hard put to it to establish a sensory level. I recall a patient, a high-strung French woman, whom I suspected of having a spinal tumor. Her legs were spastic but I never could find a definite level with the ordinary tests. Finally, one day when it was very hot, I tested her with a small cake of ice and definitely established a sensory level. I took out the tumor, a very small one, and she has been perfectly free of symptoms since. It is not very often that one removes a spinal tumor and has all spasticity and sensory loss clear up, but this does occur occasionally. Sensory levels to be of value must be found at the same level at several examinations.

4. These first three sets of tests indicates the level of a lesion but they throw no light on the pathology. A tumor or focal inflammatory process causes a block, partial or complete, of the cerebrospinal fluid. Therefore we always use the test devised by James B. Ayer of Boston known as the Quackenstedt test. This consists of doing a lumbar puncture with the patient on his side and connecting the needle with a fine caliber glass tube. If there is a block in the subarachnoid space interfering with free movement of the cerebrospinal fluid, on compressing both jugulars the fluid will not rise, while if there is no block it will rise and fall rapidly. If there is a partial block, it may rise slowly and very slowly regain its original level. In addition to this, the fluid below a lesion may be yellow, coagulate, and have a higher protein content than fluid taken out above the lesion, preferably at the cisterna magna.

I have seen a negative Quackenstedt in a number of spinal tumors, especially intramedullary ones or where the tumor was too small to cause a block but, as a rule, the Quackenstedt is positive in the case of a tumor.

If the history indicates a slowly progressing lesion, a negative Quackenstedt test would not, in my opinion, exclude a tumor.

I still believe, as I always have, that a patient with the evidence of a focal spinal lesion is entitled to an exploration, granted that the surgeon has mastered the technique of laminectomy.

5. The cystometric studies of Rose have been of great help in differentiating lesions above the bladder center in the cord, lesions of the bladder center, and lesions in the peripheral mechanism. To those particularly interested I would refer them to Dr. Rose's series of articles.

6 & 7. The x-ray, of course, must always be made use of but, with the exception of fractures or dislocations and very occasional bony or cartilaginous tumors compressing the cord, it is of little value. When the level of a lesion cannot be determined by means of any of the foregoing signs, an opaque substance, lipiodol, may be injected into the cisterna magna and then followed by an x-ray picture with the patient in the upright position. If there is a lesion blocking or compressing the cord, it will be caught at that point and give a most beautiful picture, but as evidence accumulates we are coming to realize that lipiodol is by no means innocuous. It is not bland and harmless as was claimed by Sicard and Forrestier; it is irritating and causes a marked reaction inflammation in the meninges. About a year ago Loyal Davis published a striking piece of experimental work from his laboratory showing the pathological lesions produced by lipiodol. Others have reported similar observations and therefore I feel that it should not

be used promiscuously but only with great caution. When I have used it I inject from 1-2 c.c. sterile lipiodol into the cisterna magna. Spinal air injection for determining the level of a tumor, though certainly far less irritating, has not been satisfactory in our hands, as the detail of the plate is not sufficiently clear.

8. About three years ago Fay reported a series of focal spinal lesions in which he claimed to be able to establish the level of the lesion by means of vaso-motor changes in the skin. By suddenly exposing the patient to cold air or to cold water, he was able to see a change in the skin segments above and below the lesion. Though the report is of great interest, I have not found the test very valuable.

The problem of what to do for fractures and dislocations with cord symptoms has always been a difficult one and one on which men have differed very radically. There have been those who have advocated operating on fractures with cord symptoms, a second group who have advocated never operating on fractures, and the largest group that have held a middle course. I have belonged to the last group but have, in the past years, operated on fewer cases since Coleman has introduced the use of the Quackenstedt test in differentiating the operable from the inoperable cases. If the Quackenstedt test is positive, shows a block, a fragment of bone is compressing the cord and operation is indicated, but if there is no block operation will be useless. The application of this test has done away with a good many unnecessary explorations. It is a most valuable contribution to the subject.

The very rare focal inflammatory lesions, abscesses, should be operated upon.

Now, about the diffuse inflammatory lesions—meningitis. I began to do spinal drainage in meningitis some ten or twelve years ago and I still do it, though lately—in the last two years—I have done a number of cisternal drainages in preference to lumbar drainages. The lumbar drainage is not a difficult surgical procedure, though the cisternal drainage is a very formidable one, especially in inexperienced hands. We have cases well today that would undoubtedly have died without operation, and though the mortality will be high it is, in my opinion, absolutely justified and indicated since the mortality without operation is practically one hundred per cent. We have done this operation in 40 cases with 7 recoveries.

Before closing, I must take up the question of what is myelitis and what can we do about it. A transverse lesion of the cord occurs suddenly without prodromal symptoms and produces a picture indistinguishable from tumor compression, but in these cases one never finds a positive Quackenstedt. We do not know anything about the pathology of this clinical picture and operation affords no relief. If there is any evidence of a block, these patients should be explored. When there is no block, the neurological surgeon will have to judge the case on its merits.

SUMMARY

1st. A tumor of the spinal cord is a surgical disease.

2nd. Every patient with a lesion of the cord on whom a definite level can be established should be considered a potential surgical problem.

3rd. The usual motor and sensory tests, together with the Quackenstedt test, are adequate as a rule to make the diagnosis.

4th. The injection of a foreign substance, which is nonabsorbable, into the spinal subarachnoid space is a procedure to be used with great caution.

5th. Drainage in meningitis, until some better procedure is discovered, is recommended in selected cases.

OPHTHALMIA NEONATORUM*

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CHICAGO

While it is known that there has been a marked and steady decrease n the number of cases of ophthalmia neonatorum and especially of cases of blindness due to the gonococcus since Credé[1] first published his work in 1880, most of us will admit there is room for improvement. With this view in mind I wish to present the results of a bacteriological study of 80 cases of ophthalmia neonatorum, and to discuss the in-

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*Read before the Section on Eye, Ear, Nose and Throat, Illinois State Medical Society, East St. Louis, Ill., May 5, 1931.

cidence, types, prophylaxis and treatment of this disease.

The work presented, represents a series of 80 cases of ophthalmia neonatorum from the Eye service of the Cook County Hospital, Chicago, from December 1929 to January 1931. All cases were seen from 36 hours to two weeks after birth. Cultures and epithelial scrapings were made within a few hours after the condition was recognized. Besredka's egg medium was found to be capable of growing most of the organisms, except the gonococcus, and for this Kinsella-Broun-Garcia's[3] medium was found to be excellent, growth appearing within 24-48 hours. Epithelial scrapings were made of all cases with a sharp spatula, no cotton applicators having been used in preparing the slides. Slides were stained by Gram's method, methylene blue and Giemsa. Microscopic examination of the culture was made from a Gram stain after 24-48 hours—and in a few cases 72 hours' incubation.

Of the 80 cases studied 36 were born at the hospital and represents 4187 births, 4 of these showing a Gram-negative intracellular diplococcus. The balance of the series, 44, were sent in by the Health Department, the family physician or brought in by the Society for the Prevention of Blindness or by one of the parents. Of this number, 32 showed a Gram-negative intracellular diplococcus.

The table below (Table 1) is self explanatory.

TABLE 1

No of cases showing same organism in scraping and culture.

Gonococcus	36
Pneumococcus	13
Staphylococcus	3
Mixed organisms	3
Morax-Axenfeld bacillus	1
No organism	14

A word as to the clinical picture. Every case varied, but on the whole one may summarize the general characteristics of cases as grouped in the above table. The 14 cases showing no organism on scraping or culture, were mild, discharge appearing on the 2nd to the 12th day, running a mild course and clearing up within a few days on irrigations of normal saline. Although the cause of these is uncertain, the most probable one seems to be the chemical effect of silver. The 13 cases that showed a Gram positive extra-cellular diplococcus were first seen from 2-15 days after birth. A number of these cases ran a more protracted course and resembled in many respects gonorrheal ophthalmia, that is, the cases were quite severe for a day or two, but subsided with the routine treatment. None of these had corneal involvement, but a few showed tendency to bleeding when the conjunctival surface was rubbed with a wet cotton pledget. The cases showing staphylococcus, and those which showed a mixed infection on culture and scraping had an uneventful course. I call your attention to the one case showing a Morax-Axenfeld B. infection. This occurred in an infant 2 weeks of age and ran a protracted course, was bilateral and resulted in corneal involvement in one eye which went on to almost complete opacification. Incidentally the Giemsa stain showed cell inclusions in this case.

Table 2 is a resumé of all the findings. Attention is called to the 6 cases showing inclusions bodies, three of which showed no organism on scraping or culture, one a pneumococcus, one a mixed infection and a sixth, the Morax-Axenfeld B.

TABLE 2

Resumé of all cases.

	Epithelial scraping	Culture
No organism	20	21
Pneumococcus	13	14
Staphylococcus	6	5
Mixed organisms	4	3
Morax-Axenfeld B.	1	1
Inclusion bodies	6	—
Gonococcus	36	—

There can be no question in anyones' mind that the occurrence of ophthalmia neonatorum has been reduced since the introduction of Credé's method. In our present series of 4187 births there were 36 cases of all types, 4 of which were gonorrheal, the balance showing an organism or no organism on culture or scraping. Credé in his first published work shows a morbidity of 13.6% in 1874 before the use of silver and 0.49% in 1880 after the use of silver nitrate. Abegg[4] in 1881 in a series of 2268 births had 66 cases of ophthalmia neonatorum after the use of ½% silver nitrate. Bayer's[5] incidence of infection which was 8.1% to 14% in 1877, fell to none in 361 births after the use of Credé's method.

The occurrence of the different types of ophthalmia neonatorum in the present series is best seen as given in Table 1. It will be noted that less than 50% are gonorrheal ophthalmia.

About 1-5 of all cases show no organism on scraping or culture and the balance showed an organism on scraping, but not on culture or vice versa. Groenouw[6] in an exhaustive study of 100 cases of ophthalmia neonatorum found 41 were of gonorrheal origin, about ⅓ showed organisms and the balance no organism. Waldeck[7] in 1922 quotes Cheney as showing 55% of 233 cases showing the gonococcus, Derby 51.3% in 149 cases and Stevenson 65% with argyrol as a prophylactic. There is a type of ophthalmia neonatorum commonly known as "Inclusion Blenorrhea" in which the inclusion body is found but no organism on scraping or culture. In the present series 6 such cases are shown, 3 of which showed no organism—and 3 with organism. In a perusal of the literature one is surprised to find the erroneous impression as expressed by Mehl[8] and others that all cases not showing an organism on smear are so-called "Inclusion Blenorrhea." In the light of our present knowledge as to the pathogenesis of the inclusion bodies and the cases just mentioned, it does not appear to the author that the view expressed by Mehl and others is correct. The possibility exists that a certain type or types of undetermined organism, possibly of the nature of an ultra-microscopic virus may cause a conjunctivitis in which a number of such inclusions are formed as a product of the inflammation. The fact that the inclusion body has been found in the epithelial cells of other mucous membranes and in cases of ophthalmia neonatorum other than so-called "Inclusion Blenorrhea," and in different types of chronic conjunctivitis must lead to the conclusion that there is no specificity to be attached to these bodies.

One cannot discuss the question of prophylaxis of the eyes of the newborn without being drawn into a discussion of blindness due to the gonococcus. It is noteworthy that in 22 German asylums for the blind in 1876, Cohn[9] reported an average of 30% as due to ophthalmia neonatorum, while in 1896 in 45 institutions this had been reduced to 19%. Waldeck in 1922 reported about 25% in the U. S. and Adams[11] 10% in Illinois in 1914.

Credé[10] in 1883 reports that Bischoff who had disinfected the vaginal canal before birth with 2% phenol and then washed the eyes with salicylate water had a morbidity of 5.6% of ophthalmia neonatorum. A. Graefe[12] in 1879 by stroking the lids with 1% phenol showed a morbidity of 3.6% of ophthalmia neonatorum. There have been other drugs other than silver nitrate used as a prophylactic, but none have proved as efficacious as silver nitrate. Dauber[13] in 1904 used protorgyrol, but the morbidity was much higher than with silver nitrate. Iles[14] in 1927 reports a series of cases in which mercurochrome was used. In 1929 Douglass & Stone[15] of Australia were using 5% Argyrol when an epidemic broke out and this was stopped by the use of 1% silver nitrate as a prophylactic. The question may be asked, why do any cases of gonorrheal ophthalmia occur after the use of silver? Crede-Horder[16] in 1913 reports several cases of gonorrheal ophthalmia as late as the 12th day post-partum, and each case had been traced to post-natal infection by the mother. Pohl[17] in 1927 reports 17 cases representing 9,000 births, most of these being late infections. Lehrfield[18] in a survey in Philadelphia in 1922 reports, that of the 35 cases of ophthalmia neonatorum reported to the Health Department, 15 gave no history of using a prophylactic. Many cases may also be traced to the use of old silver nitrate. In Germany[19] it has become unlawful to use silver over a month old. Probably one of the most striking examples of the efficiency of silver nitrate as a prophylactic is reported by Norrie[20] in 1923. He states that in Denmark with a population of over three million only one case of blindness was reported as due to gonorrheal ophthalmia, and he attributes this not only to the state control of the midwife, but also to the use of silver nitrate. It will be seen by the foregoing that although silver nitrate will not prevent all cases of ophthalmia neonatorum, nevertheless, if a fresh solution is used and properly applied, one can say with assurance that cases of blindness due to the gonococcus may be markedly lessened, and that such state measures as will put the control of births under the direct supervision of a physician, together with the compulsory use of silver nitrate or its equivalent will go a long way towards eradicating all cases of blindness due to the gonococcus.

Within the past five years, according to my own knowledge, and within 15 years, according to information from members of the staff, there has not been one case of blindness due to the

gonococcus if the case when admitted had no corneal involvement. This wonderful record stands as a monument to those who are entrusted with the prophylaxis of the eyes of the newborn, and the treatment of ophthalmia neonatorum, and it stands as an answer to those who would oppose medical supervision of all births.

The treatment as carried out at Cook County Hospital is applicable to all cases of ophthalmia neonatorum. Those cases which are the result of a silver reaction should be treated with kindness. There is already present a conjunctiva that is suffering as the result of a chemical irritation. All it requires is an irrigation of saline or boric solution every 2-3 hours—and several hot applications a day applied for ten minutes at a time. Intensive treatment will do this type of eye more harm than good. It prolongs the irritation. Those cases due to the staphylococcus and other organisms except the gonococcus are irrigated every one, two or three hours according to the amount of discharge, together with an antiseptic like 1% mercurochrome dropped into the eye four times daily. In severe cases irrigations will have to be done more often. Silver nitrate 1% is rubbed over the conjunctiva once daily followed by an irrigation of saline. None of the above types have received any protein therapy, except the gonorrheal ophthalmias.

The gonorrheal ophthalmias are given intensive treatment. The first requisite for success is an intelligent nurse who understands and appreciates the seriousness of the case. She must be shown and taught how and when to irrigate the eyes; viz; so as not to injure the cornea. A hard and fast, non-flexible routine will never lead to success in the treatment of ophthalmia neonatorum. The eyes are irrigated with saline or boric solution every 15 minutes or when necessary. Iced compresses the first 24-48 hours applied continuously will help much in keeping down the edema. An antiseptic such as 1% mercurochrome is used 3-4 times daily and 1% silver nitrate is rubbed over the conjunctiva once a day, followed by an irrigation of saline. Some of the more severe cases are given 2-3 cc. of boiled milk, the milk being boiled for three minutes, and injected intermuscularly. Erben[21] at the Elschnig Clinic in Prague in 1922 reported on a series of 45 cases of gonorrheal ophthalmia, 25 of the series receiving milk injections, about 3 cc., and found that the course was shortened, and the organism disappeared within two or three days. Others[22] have used larger doses of milk.

In closing I want to summarize as follows:

1. That distinct types of ophthalmia neonatorum has been demonstrated.

2. That the so-called "Inclusion Blenorrhea" is a misnomer, and that the inclusion body is not specific for any disease of the conjunctiva.

3. That silver nitrate 1 or 2% stands out preeminently as the most efficient prophylactic to be used in the newborn, and

4. That medical supervision of all births, together with the compulsory use of silver nitrate as a prophylactic is the method of choice in reducing or eradicating all cases of blindness due to the gonococcus.

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DISCUSSION

Miss Audrey Hayden (Secretary, Society for Prevention of Blindness) Chicago: This winter we have put through the bill at the Legislature which you have all heard about. It makes mandatory the treatment of babies' eyes at birth. It has passed the House and Senate after a bitter fight with the Scientists and is awaiting the Governor's signature. We have found seventy-two babies blinded by ophthalmia neonatorum in the past eight years in Illinois. Our Society is working all the time for medical supervision of childbirth and we hope we have accomplished something.

Dr. N. K. Lazar, Chicago: One of the excuses for this paper was to call attention to the fact that some of the hospitals are using prophylactics about as efficacious as water.

VALUE IN BEDSIDE NURSING IN A PUBLIC HEALTH PROGRAM*

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The objectives in any public health program are "to assist in the efforts of the community to prevent disease, reduce the death rate, promote and conserve health by the application and dissemination of the knowledge we possess of preventive medicine."

The hospital nurse is trained to give skilled nursing care to the sick individual and in every way to help the physician to return him to normal health. When I graduated from training nearly twenty years ago, the average nurse was not concerned with elevating the standards of living or promoting the health of the community.

Today, many hospitals attempt to give the student nurse at least a public health viewpoint —some offer an opportunity for observation or practice with an organized nursing staff having teaching facilities. Public health nursing courses for graduate nurses were made generally available throughout the country after the war. The nurse, just as the physician when he enters the field of public health, acquires a new outlook in the matter of both individual and community health. The nurse's business in public health is to help the physician and the health officer to reach the families of the community in an effort to promote and conserve their health.

In order to play her part as an ally of the local physician and the health officer, she needs in addition to good hospital training, the possession of knowledge of human nature, the ability for self-expression, and a personality necessary for salesmanship. She should know something about all of the health department, and about public health in general, and of other official and non-official agencies within or related to the field of public health. She should have accurate knowledge of the fundamentals of preventive medicine and have the ability to interpret them to families, especially mothers and children, in understanding language, and in a way not detrimental to the best interests of the family physician. We have to remember that methods and procedures change as often as there are new discoveries in medical science and we in nursing try to keep step with our co-workers in medicine. The White-House Conference challenges us—both physicians and nurses—to more adequately fulfil the duties imposed upon us both in the institutional and in the public health field.

The work of the physician who is not giving whole time to public health is safeguarded in working with nurses well grounded in public health nursing. The preparation for public health nursing is comparatively new, and since the field is quite attractive it seems necessary that certain standards be maintained in fairness to both the nurse and the community pocketbook. Some exceptional nurses have done remarkable pieces of work with a minimum of preparation and a maximum of personality and good sense.

Dr. Vaughan, in addressing the American Public Health Association, states that the public health nurse constitutes the most important asset in health education. Fifty per cent. of the appraisal for health department activities is allowed for public health nursing. In making a bedside visit to the home the trained public health nurse considers the whole family as a unit and in giving bedside care she becomes aware of the other health needs of the family.

Some people may think any good nurse may do visiting nursing in the homes, but today we are asking our nurses who do bedside to interpret the whole health program to the people. That demands teaching, and teaching demands a well prepared nurse. It goes without saying that the nurse doing any kind of public health nursing, should be an ally and co-worker of the official health agency of the community.

Summarizing the aims of some of the various visiting nurse organizations, the American Red Cross Nursing Service, the Metropolitan and other life insurance nursing services, and the National Organization for Public Health Nursing, we have the following aims common to all:

1. To give skilled nursing care to the sick person in his home under the direction of his own doctor.

2. To instruct the patient's family in home nursing and the laws of health, in accordance with the teachings of the modern health officer.

*Read before the Section on Public Health and Hygiene Illinois State Medical Society. May 7, 1931, E. St. Louis.

Efforts are being made everywhere to include the practicing physician in the health program. Public health has reached the family, they say, but often is only tolerated by that family's physician. After all it is the family and the family physician who are directly responsible for the health of the family.

One link in this chain of health work in which the nurse and the family physician participate, is bedside nursing—a very effectual and practical way of working with the practicing physician for family and community health. Visiting nursing began with bedside care to poor people who had no one to care for them. Out of this has evolved a service that may reach all persons in the community regardless of financial standing, a service that is helping to solve a big economic problem, and one that helps to meet the objectives in all phases of the health program.

No bedside nurse's work is considered effective today unless she has used her opportunities while in the home to teach the family its particular needs in relation to hygiene and the prevention of disease. This concrete service is productive of confidence and friendliness without which no instruction is effective.

To make more clearly my points in respect to bedside nursing may I refer to the work of the Hygienic Institute with which I am connected. This is a private organization accepted officially as the Health Department for La Salle, Peru, and Oglesby, Illinois. It is situated uniquely for promoting community health. It serves an industrial community of approximately 30,000 persons. A full time Health Officer is in charge, and other personnel are employed to make up a fairly complete public health center. Politics make very little change in the health department. The nursing division has six field nurses. Each field nurse is furnished with a car.

Because of the difficulty in maintaining an absolutely generalized nursing service in a community that has eight parochial schools drawing their attendance from all sections of the towns we might say we maintain a modified generalized nursing service. One nurse is designated as a "floater" to carry the major and most urgent bedside nursing, the other five have their own district or territory, and each of the five carries her part of the bedside nursing, in addition to schools and nearly all other phases of public health nursing. In the event of an epidemic in a school the work is so arranged that there is no delay in reaching the school early for inspection. Care is taken in giving out calls in contagious disease nursing to the nurses visiting schools.

The illness of the Metropolitan nurse who had established bedside nursing in two of our three towns, necessitated a change, and a contract was secured with the company for their work four years ago. An industrial nurse covered the third town until the beginning of the financial depression causing the industry to drop its nurse. Thus, there was considerable foundation for our work.

It was very evident the first year that both families and physicians had a stand-offish attitude toward the nurses from the health department, in the bedside program. The work of previous years fell off considerably. However, after a period of two years or so, things changed. During the winter months when respiratory infections are prevalent, we almost hesitate to say that such a service is offered because we are barely able to carry on without adding to the nursing staff. The service is more and more appreciated by families and physicians. A service that provides facilities for cooperative work in the home under the direction of the physician in charge of the case is a distinct advantage to both patient and physician. Many patients who are too ill to be moved, or are not too seriously ill as to urgently demand hospitalization, and whose financial circumstances are such that they can ill afford the expense of full time nursing or hospital care, in any event, are much benefited by the daily call and attentions of the visiting nurse service. Out of a total of 13,500 home visits for 1930, 30 percent. of them were calls in which bedside care was given.

No more than two calls are made on a patient without a physician in attendance. Orders are secured from the doctor if service is needed and desired, and continued as a rule as long as there is a need for care or supervision. Some physicians have given standing orders for maternity cases and others, and ask us to always give general care and make their patients comfortable until we can get in touch with them. The confidence of two physicians is expressed in the fact that when they left for their vacations last sum-

mer, they referred returns from hospitals, convalescents and prenatals for follow up during their absence and gave names of physicians they wished called as necessary. Last year 70 per cent. of the calls came from the families, 14 per cent. from the physicians, and 16 per cent. from other sources. Calls coming directly from families were classified as family calls although it was known many resulted from the physician's desire for nursing service. A few doctors have never called for service, and we have reason to believe that in some instances the service is tolerated because the family desires it.

The charity work for the last year was much higher than usual due to the non-employment in industries. The pay service reaches many of the most independent homes in the community.

Physicians' calls are for prenatal care to expectant mothers, postnatal care, care to newborn, infant feeding problems and care of the sick baby, demonstrations directed to educate mothers in care and nursing, demonstrations to young mothers delivered in hospitals, acute respiratory infections in all age groups, intestinal disturbances in small children, complications of communicable diseases such as otitis media requiring careful attention, catheterization and bladder treatments for women, demonstrations to patients of gynecological treatments to be carried out in the home, colonic flushings, ear and eye treatments, and other general medical nursing.

The service to chronic and senile cases is small but there is always some of it. An attempt is always made in these cases to teach the family to care for the patient, while the nurse gives supervisory care for the prevention of bedsores, and carries out any doctor's orders necessitating more skilled attention. The opportunities for teaching in the homes of the chronic and senile are limited, but friends are made for the health organization in all of its work in these families and among their friends. Physicians appreciate very much the advantage of the skilled nursing service when it is needed in these instances.

The nurse and the family physician working together for the promotion of health in the family have a common interest that begets understanding. The "we" spirit in the bedside care of that individual brings the physician and the nurse together. It engenders a mutual respect and understanding which is beneficial to both. If the physician has any fear of encroachment on his practice or loss of confidence of his family, it is overcome in this effort to make the patient well. The doctor invariably gets more calls from the family because of that cooperation with the nurse. The end result of this working together is a better understanding all around. To some physicians, the laboratory of the health department is the only part that exists as far as they are concerned because it means service in their practice. It might be well to consider the direct advantage that bedside nursing is to the physician in his practice as well as its value in making the health program more effective.

Prenatal nursing is not developed in our program to our satisfaction, nevertheless with the growth of bedside nursing, our opportunities for prenatal nursing increased materially. Many of the expectant mothers in the beginning tolerated prenatal instruction because they were dependent on the nurse for care after delivery. They all know, now, the first thing the nurse does is to insist on medical supervision and it is explained to them why it is so important for them and the new baby. Each year has seen a lengthening of the time of the prenatal period for medical supervision and nursing instruction. The nurse is guided of course, in her instruction by the decision of the physician as to the place of delivery. The mother is instructed as is usual in prenatal care and kept in touch with her family physician. One physician said not long ago that he preferred to have his deliveries in a hospital because it was usually best for the mother and easier for the doctor, but he added: "95 per cent. of my people do not go to a hospital." He said the maternity service was valuable to him and his patients—everything was ready when he was called—the mother and baby had less complications in the home—there was better breast feeding—the family gave much more intelligent cooperation in homes visited by the nurse—he was relieved of many small details of the after care. And he said further: "You know the nurse can get any health work across to that family after she has cared for a mother and baby in the home." The same physician lists his prenatals with the nurse and sends his infants to the infant welfare station. This is the kind of rela-

tion that exists as a direct result or outgrowth of bedside nursing.

The first lesson taught in the home of the postnatal is the importance of following the doctor's instructions. The nurse demonstrates with her hands to the relative or woman in charge—cleanliness in all things pertaining to contact with the mother and baby. Sterilization of various things for their safety is taught by demonstration. Literature is left for the mother to read while she is in bed. Instruction is given in every detail to the young mother in regard to feeding, bowel and sleeping habits, the proper clothing, care of the nose, the genitals, and so forth, and she is invited to come to the infant welfare conference. This cooperation of the public health nurse and the physician in the program of maternity and infant hygiene is certainly foundational.

Frequent calls are requested by both physicians and families for postnatal service to mothers delivered in hospitals and who returned home early to save hospital expense, and also for demonstration of the care of the baby. About 40 per cent. of the bedside calls last year were to maternity and newborn. As our maternity, infant and preschool hygiene can be made more general and more effective, we have reason to conclude there will be as Dr. Haven Emerson puts it, an increasing "smallness of the number of abnormal children entering school."

The baby is often sick because of neglect of good baby hygiene. This makes a good background for positive health instruction. The baby might possibly recover without either the doctor or the nurse, but this is an opportune time to impress the mother with prevention. Whooping cough was recently covered up in a family who were neighbors to another having a five weeks old infant. Other children in the family contracted the disease and carried it home to the baby, whose condition became complicated by a serious conjunctivitis. The doctor gave whooping cough vaccine which seemed to aid materially in controlling the disease. The little one's life was despaired of for a week. The doctor requested nursing visits twice daily during this critical period and he saw the baby frequently. Due to unemployment, the family was in poor circumstances. The attention of the whole neighborhood was directed to this home, and the nurse in her rounds made a point of the incident. The fact that additional medical and nursing attention were necessary to save the tiny life and that carelessness was at the bottom of it, was quite a lesson to the neighborhood in the necessity for control of communicable disease.

In one of our towns, the attendance to the well-baby conference hardly paid for the time spent on it. The population is largely foreign. The question was whether to continue, or use the nurse's time elsewhere. As an experiment, special emphasis was placed on the well-baby conference in our maternity bedside nursing especially with primiparas who really needed help and advice. Our impression that the 50 per cent. gain in attendance was influenced by bedside care was verified in an actual check-up showing that 48 per cent. of the new babies had bedside care in the homes, also that 35 per cent. of the new babies entering were from two weeks to three months old, and 80 per cent. of the new babies under six months of age were breast fed. We have to allow for the type of population here on the breast feeding. Not all of the credit goes to bedside nursing, since new mothers are visited with literature and the blue certificate of birth registration issued jointly by the State Department of Public Health and the Hygienic Institute. However, our figures justify our claim that the bedside nursing materially influenced the attendance to the well-baby conferences.

A doctor called for service to a very sick baby last summer with an undiagnosed illness. Precautions were used in the home with the other children. The disease turned out to be infantile paralysis. Nursing care was given during the acute condition and follow up calls were made after. There may be little to be said of the lesson in communicable disease control, but the family became good friends of the nurse, and she has found most understanding cooperation in infant welfare, preschool, and school situations since. Three preschool children of this family were brought to the first preschool clinic and immunized against diphtheria.

Preschool clinics were initiated in the health program last fall. The nurses talked about them on all kinds of home visits because they were new to the community and few had heard of toxoid. An actual check-up showed that 5 per

cent. of the attendance resulted from contact with the woman's clubs, 21 per cent. from newspaper items and unknown sources, 28 per cent. from bedside nursing, and 48 per cent. from all other visits to homes. The bedside was not the most important factor in interesting mothers, but it was equally as important as other contacts.

Recently a physician called for bedside nursing for an advanced case of tuberculosis not previously known to the doctor or to the health department. The home consisted of four rooms. The father, a man of 53, was the patient. His wife had done some midwifery and thought she was capable of handling the situation. A cuspidor was used for the sputum, and usually, in his weakened condition, he did not reach the cuspidor. The wife and her 15-year old son slept near by in the same room. A daughter of 20 had the other bedroom; she was doing piece work in a factory, part time, and was the only source of income. A married daughter was arranging to come home to be confined by her mother and bringing a 15-months old child with her. Grandchildren nearby played in and around the home. This is a situation which presents many problems—opened up through bedside nursing needs. A case of tuberculosis with many contacts, a prenatal, an infant, several preschool and school children, a boy in his teens directly exposed, and several social problems calling for expert direction from a trained social worker. This combination of problems not infrequently found by one nurse doing generalized nursing, calls for the best qualities that can be put into one woman. This again shows the distinct value of bedside service in a generalized nursing program which obviates the necessity of many specialized nurses entering the same home.

Hundreds of examples of this kind might be given to illustrate the general trend in teaching public health in bedside nursing.

The experiences of our own organization have been used to illustrate the effectiveness of bedside nursing in the promotion of a public health program, and are not peculiar alone to our organization, but are applicable to the work of any health organization.

To summarize briefly the foregoing points on the value of bedside nursing in a public health program, may I repeat and emphasize the following:

1. In the formation of any community health program, it is well to keep in mind the obvious advantage of cooperation with any organization offering bedside nursing to all of the citizens of the community.

2. Although it takes the best type of nurse to do any effective public health nursing, the resistance to being given advice is broken down in the rendering of an appreciated service.

3. Bedside nursing is often the only means of reaching some homes for effective health teaching because it is something they can see and understand.

4. Health organizations profit in the contact with superior homes. The people in those homes become better acquainted with the work done, their influence helps the community attitude and sometimes the health budget.

5. The nurse stands against medical quackery and is a strong factor in helping the family to see proper medical care in the right light.

6. Hourly bedside nursing meets an economic need.

7. A public health organization whose keynote is service to patients and physicians goes a long way in bringing about cooperation in the community for furthering health work.

8. A city offering bedside nursing through any health organization, meets the objectives for any public health work, namely: "assisting in the prevention of disease, the reduction of death rate, the promotion and conservation of health by the application and dissemination of the knowledge we possess of preventive medicine."

DISCUSSION

Mrs. Irene McCullough, Supervisor of Nursing, Metropolitan Life Ins. Company: I think Miss McGreevy's paper definitely illustrates the need for well trained nurses in the Public Health field. Unfortunately the idea is still somewhat prevalent among the medical, lay and even nursing groups that any graduate nurse is qualified for public health work. We have numerous nurses applying for public health positions and when we mention the fact that additional training and experience beyond the hospital training school is essential they are quite amazed. We do find many hospitals of today including public health nursing in their curriculum, but unless the practical experience particularly is given under excellent supervision it is better that the nurse not receive this phase of nursing during the hospital training.

We are making every effort to maintain the standards

set up by the National Organization for Public Health Nursing, whereby we encourage nurses interested in entering the public health field to either take a credited course in public health nursing or connect with a well organized Public Health Nursing Association.

The work of the nurse in the home is much broader in all aspects than her work in the hospital, so much so that unless she has had a post-graduate course in public health nursing or a year or more experience under supervision in a public health nursing association, she should never attempt taking a position where she will work alone.

I believe anyone familiar with the work of the public health nurse will agree that she constitutes the most important asset in health education. The scope of her activities depends largely upon the program of the community in which she is working. Some programs specialize in school nursing, others in tuberculosis nursing, still others in industrial nursing, child welfare work, etc.

The generalized nursing program includes bedside nursing. It is still the belief among many that a nurse rendering bedside nursing is not a public health nurse. She is absolutely a public health nurse to the fullest degree. She visits the home in the time of need and through her work with the sick member of the family is able to observe health and social problems existing in the home and accordingly put over her instruction to the family as a whole with greater effect than merely visiting the home for health educational purposes.

As Miss McGreevy stated, the objective of giving bedside care in the home is first to give skilled nursing care under the direction of a physician. I would like to emphasize this point, "under the direction of a physician." I believe the great majority of nursing associations today permit nurses to carry a nursing case for only two visits, unless a physician is in charge. On the first visit the nurse advises calling the family physician. She is permitted to make the second visit to ascertain whether or not this advice has been carried out, if so, she secures his orders for the patient; if a doctor has not been called she must dismiss the case. The well trained nurse realizes there is a distinct line of demarcation between the duties of the doctor and those of the nurse. One supplements the other and in the nature of the case their work is one of cooperation. This year many organizations are evaluating the contents of the nursing visit; it is possible that in many instances the second visit on a case where no physician has been called can be eliminated. The family being instructed on the first visit to telephone the nurse in case a physician is called and her services are needed or desired.

The second objective in a bedside nursing program brought out in Miss McGreevy's paper—to instruct some member of the family in home nursing and the laws of health in accordance with the teachings of the modern health officer. The visiting nurse is in the home one hour or less on each visit. The frequency of visits depends upon the type case. The patient usually requires care during the interim of the nurse's visits; therefore, she realizes the importance of instructing the most capable member of the family how to carry on during her absence. The nurse, therefore, goes into detail, explaining over and over if necessary how to give care and make the patient comfortable, the prevention of bed-sores, the giving of necessary treatments, etc. The nurse must know how to delegate responsibility and which responsibilities to delegate and adapt her teachings to the ability of her families to understand. Most nurses realize that eye-minded is more effective than ear-minded and accordingly carries out a very definite technique in connection with her work in the home. There is a technique to be used in connection with the nursing bag. Her hands must be thoroughly cleansed before handling any of the articles in the bag and again cleansed before replacing the articles. There is a technique in connection with the cleansing of the thermometer and in all phases of nursing. Through these procedures the nurse protects herself, her patient, the family and the community and introduces the principles of sanitation and personal hygiene wherever she goes.

The interest of the visiting nurse lies beyond the confines of the sick room. Her work in the home gives her a great opportunity to observe the health habits of the members of the family and teach the prevention of disease, sanitation and hygiene.

The visiting nurse through this well rounded service in the home is thus a public health worker, a social worker, a teacher and family friend all combined.

Miss McGreevy's paper pointed out very clearly the effect of bedside nursing on other activities included in a public health program. There is in every community a definite need for bedside care in the home. This is largely due to the lack of hospital facilities. In closing this discussion, I would like to quote from a paper given by Dr. Haven Emerson. He claims that modern medicine has for fifty years developed a technique in hospital care which depends on this same type of skill. He adds that until such skill, loyalty, resourcefulness and devotion is provided in our communities, both urban and rural, to the degree that every family receive the benefit of it in its home, preventive medicine will fail to some degree in its objective, and public health work will continue to be relatively crude and incomplete. He further states that at least one nurse trained in bedside nursing and in public health measures is needed for each two thousand persons of a modern industrial population.

Dr. Arlington Ailes, La Salle: I would like to stress a point in this paper. It is in the paper, but it is just a matter of stressing it. It is my belief that it takes a higher type of nurse to do public health nursing alone than it does to do public health nursing combined with bedside nursing. We have a lot of public health executives who say that the public health nurse has no place at all in a bedside program, or the reverse if you please, that bedside nursing has no place in a public health nursing program, but I am convinced it has.

There are two things to be greatly desired in put-

ting across a public health program. One of these is to reduce the resistance on the part of the public, to being told something or educated, by our public health nurses. The other is to get the sympathetic cooperation of the family physician. I claim that it takes a superior person to approach our people properly, when the sole mission is to demonstrate or educate. There is a certain resistance when you try to change the customs and habits of people. But when the nurse goes into the homes of these people to give them a service which they want and appreciate, like the care of the sick, she encounters no such resistance. The mental atmosphere is one of friendliness and confidence and their minds are then more receptive to public health suggestions. These people then often divulge their innermost thoughts to these nurses, and the nurse then has a much better chance to know what is needed and accomplish her mission, without in any way appearing critical or being considered an intruder.

Therefore, I claim that we can get along better in this type of combined program, with a lower type nurse, or in other words a less superior person, than we could if the bedside feature were excluded. Of course the nurse must have good sense and judgment and be trained in both public health and bedside. We take our nurses directly from the hospitals, and train them on our staff in both these fields.

Now this other side in bedside nursing that Miss McGreevy also pointed out. The doctors always appreciated our laboratory service but we felt that there was a gap between our public health service and our physicians. Meddling nurses was the attitude of many of them. But now when the nurses go into homes to do bedside nursing also, and are very careful to safeguard the interests of the physicians in those homes, the physicians see what a wonderful service can be given them and they appreciate it. In many cases where patients cannot be taken to a hospital, because of economic reasons, or where the case is such that it doesn't justify hospitalization, the physicians call our department for service. They are gaining confidence in our nurses and the work, and it is inculcating a feeling of friendliness and cooperation. We are thus able to put across other programs, because they know and understand us better. This feeling of cooperation has resulted in the physician's endorsement of our various clinics and our immunization program, and has greatly lessened the gap that usually exists between an active health department and physicians. This we think is due largely to the bedside nursing program, and could not have come so readily through our public health program alone.

Mrs. Irene McCullough: Regarding the statement that it takes a less superior type nurse for bedside nursing than one engaged only in educational work. I think perhaps it would take a nurse who had more personality and tact for educational work only, but it takes an equally qualified nurse to carry a program with bedside nursing included. The nurse doing bedside work has an easier approach to the family but during her service in the home encounters many social and health problems and unless well experienced is unable to recognize these problems and make the necessary plans and adjustments for their improvement.

You mentioned that in LaSalle you took nurses for public health work which includes bedside nursing, directly from the hospital. In LaSalle, however, these nurses are under the daily supervision of a well qualified supervisor. They are enabled to go to her with any problems encountered during the day. She visits in the homes with the nurses and interprets health and social problems and measures for their improvement, etc. This experience is comparable to the experience given in larger visiting nurse associations. It is, however, a handicap to a nurse who has had only a hospital training and private duty experience to attempt working alone and without supervision.

I, therefore, am of the opinion that perhaps a nurse engaged in purely educational work needs more tact and personality to do an effective piece of work, but do not agree that we should think in terms of lesser qualified nurses for programs including bedside nursing.

X-RAY IN DIAGNOSIS OF THORACIC PATHOLOGY*

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In the presentation of a paper to the Section of Radiology I naturally have some misgivings since I am neither a radiologist nor do I possess the necessary skill to make serviceable plates. My knowledge of the specialty is limited to the reading of plates made by others as part of the clinical studies I have made on thoracic disease in the past decade. I might better title this paper "Use and Abuse of X-rays," or "the clinician looks at radiology," for certainly we are both somewhat to blame for errors that occur all too frequently. Please interpret my remarks from the standpoint of a thoracic diagnostician looking at x-ray as a thing apart and not as his whole existence.

The habit of partial specialization has been a wonderful thing for the profession and for the ailing public during these past few years but unless we understand it and the factors that have brought it about, and most important, the proper use of specialized knowledge in limited fields, it may become a two-edged sword for all of us. If this is our net result the method should, and will fail. The best service at the least cost is the goal. Fortunate indeed is he who can keep abreast of his own line these past few years; and

*Read before Section on Radiology of Illinois State Medical Society, May 6, 1931, E. St. Louis.

attempting to cover all fields would leave no time for actual practice. There are three main types of answer to the problem of a general practice of burdensome proportions. One is a rise in price levels and weeding out. This method has serious objections to most of the profession. The second is group practice merging with sharp specialization with a general practitioner and diagnostician as the head of the organization. The drudgery is borne by the group as a whole and diagnostic and therapeutic goals are reached by assembling. This method has obvious advantages and some disadvantages not so obvious. For instance, only a few can be the head of clinics and many physicians object to losing their identity and individuality to a group, for physicians are first, last, and always strongly individualistic. Then, too, many lack the genius of organization.

Limited specialization and the use of hospital and laboratories is the method most of us use and hence the x-ray laboratory looms large as an aid in most of our activities. Bear in mind please, that diagnosis is our common denominator for all branches of the profession concerned with patients and that specialization is a post diagnostic division. This fact gives us common ground for discussion.

What should the clinical diagnostician expect of the radiologist in the thoracic field? What has the radiologist a right to expect in return?

Since our interdependence is great it seems that if both are expected to make the diagnosis then the facts of the history, physical findings and laboratory should be in the hands of both men. I am sure that you will agree that such cooperation is unusual except where the two men have had years of experience together. The radiologist, purely on his own can interpret light and shadow in terms of relative tissue density and note unusual locations. Too often much more than that is expected of him. In my judgment, this is unfair to him and often dangerous to his reputation and yet I have seen many radiologists make a clinical diagnosis and at times even suggest treatment, and worst of all attempt prognosis. And what is more, do all these things *in writing.*

To refuse a diagnosis by radiograph alone, takes more courage than shrewd guessing. The limitations of physical examinations of the chest are too well known to radiologists generally, to require more than passing comment. We admit freely that we cannot delineate the heart borders with less than two centimeters of error yet the orthodiagraph will do so. It is rare to diagnose by physical signs alone, a pneumothorax of less than five hundred cubic centimeters capacity and I have missed many a cavity of less than three centimeters and sometimes much larger where the bronchial tube has been blocked to it. These errors I expect the x-ray to protect me from. Their uniform detection requires refinement of technique that very few, if any, clinicians possess. Any fair minded man will admit it, I believe, and need not be ashamed in doing so. On the other hand there are far too many radiologists who attempt things for which the x-ray is not adequate. I have yet to see any radiologist with certainty and uniformity detect activity in a single plate in a given tuberculous chest. A progressive lesion can be diagnosed by x-ray if two or more plates are taken with an interval of several days or a month between. Differences between anthracosis, silicosis, bronchopneumonia, carcinoma, fibroid tuberculosis and syphilis are not striking enough at times for certain x-ray separation. There may be men expert enough to do it, but I have not made their acquaintance. If asked to do so he has a right to history, blood examination, sputum and other pathological reports and the physical findings as well, for the protection of his professional reputation. I neither ask such risks nor expect it of the very good friends I have who do the x-ray work for me. Usually the plates are read in conference and I watch the fluoroscopy, or do it myself and the question is settled by two heads together. Occasionally time proves us both wrong much to our chagrin!

From my viewpoint the radiologist should read a plate in terms of pathological densities without reference to final diagnosis. This last is the province of both men working together, or the clinician alone. I do not subscribe to making the radiologist a mere photographer. My plan makes him much more than this and makes him party to any credit or error that is made. Knowledge implies responsibility according to its extent and x-rays may at times be dangerously misleading.

I believe the clinician is woefully negligent at

times in his x-ray dealings, in his desire to secure x-ray help he often fails to explain to the patient just what it can, and cannot do. At times it is overemphasized, naturally enough, and at times not insisted on where it should have been. We have not learned to use the lateral and oblique positions as often or as intelligently as we should and the fluoroscope is sometimes better than a plate where diaphragmatic or mediastinal motion is in question. We have overlooked a good deal by not recognizing that the roentgen ray has three methods of showing pathology, simple density, motion, and outline of opaque substance within a hollow viscus such as lipiodol in the bronchi or barium in the esophagus.

In spite of many adverse opinions, I believe all chest plates should be made at the two meter distance. Not only does this lead to uniformity of standards for comparison and little distortion, but such plates can be used for cardiac measurement. I am also a strong believer in very short time exposure as only by this can good detail be secured in the lung, and detail is all important. Stereoscopic plates are easier to take with good apparatus than two plates of other types and should be the rule rather than the exception. The amount of over or under development one likes depends a good deal on the individual taste and varies as much as our time honored stethoscopes. It depends on what one is accustomed to within rather sharp limits. I believe that color and density perception in men is equally as variable as acoustic ability. The position of the patient may often decide the difference between pleural fluid and pleural thickening so that upright posture wherever feasible is safer procedure, all things considered. We have all seen relatively large effusions completely overlooked by neglect of this simple precaution.

The value of the Roentgen ray from the standpoint of thoracic disease can scarcely be overestimated. It is used too little rather than too much. I am sure that the percentage of patients in which I demand it has risen markedly in recent years, though I doubt if I need it now as much as I did then. Perhaps hard knocks and bitter experience have made me more wary. I have learned that in medicine there is no "always," and no "never," and that if one practices long enough he experiences most of the mistakes and disappointments that others have had. I should certainly hesitate to deny tuberculosis without the comforting assurance of the x-ray plate. I agree with Plunket (N. Y. State Journal of Medicine 30: 1420-1422, December 1, 1930), who said "Pulmonary tuberculosis without diagnostic physical signs, exists more commonly than is generally appreciated, even in moderately advanced or far advanced stages."

Again we have found in our Springfield plan of complete study as reported in part by Bain (Illinois Medical Journal, December, 1927) that physical examination and x-ray together will give a proper diagnosis three times as often as x-ray alone or twice as often as physical examination alone.

In conclusion let me reiterate that I believe the x-ray to have been of immeasurable advantage to the men interested primarily in lung work. It is not at present as generally employed as it should be. On the other hand x-ray photographs should be advised with intelligence and the type changed to produce the end in view. Routine x-ray plates of the chest, while valuable will not always be sufficient. What we need I believe is not more plates, but more use of all the x-ray has to offer.

AN EVALUATION OF DIAGNOSTIC METHODS IN GASTRO-INTESTINAL DISEASE*

LOWELL D. SNORF, M. D.

CHICAGO

Of the commoner groups of symptoms with which the general practitioner comes in contact none are more complex in their manifestation than those arising from the gastro-intestinal tract. Their interpretation is even more baffling because of the multiplicity of sources of irritation and the varying responses of individuals. Too often the physician has in mind neither the pathology most frequently present nor the natural disturbances arising therefrom. He must appreciate that probably less than 25% of his patients who are complaining of symptoms have organic disease and when organic defects are revealed he must still be alert to the possibility of associated functional disorders, that he may in-

*Chairman's address read before the Section on Medicine of the Illinois State Medical Society, May 6, 1931, East St. Louis.

telligently carry on the subsequent treatment. Why is it that so many examinations are concluded and the final diagnosis made of neurasthenia, nervous indigestion or chronic appendicitis? What a multitude of sins and mistakes are covered by the term nervous indigestion. If it could be intelligently interpreted instead of a universal catch-all, we could feel more lenient to its use and fewer patients would be mistreated. Such diagnoses are made because of an inadequate knowledge of the normal physiological function and a lack of appreciation of the close correlation between the gastro-intestinal tract and the other organs of the body. If he was thoroughly conversant with these facts he would not find it necessary to be so dependent on the roentgenologist, for instance, to get the final opinion. An x-ray examination is usually very helpful and often necessary but is seldom of great value in interpreting the functional type of disorder except to rule out organic pathology. For after all disturbances produced by dietetic error, or associated with pathology of other organs can only be fully understood by sitting down with the patient and carefully working out the picture. Too commonly, our present methods when analyzed appear more and more dependent upon laboratory and mechanical technique and not enough on the personal investigation. In our text-books today we are burdened with terms in diagnosis which should be relegated to the scrap heap and are largely of historical interest. For instance gastrosucchorrhea, from the days of Reichmann referring to excessive secretion, which we now know is a symptom associated with obstruction at the outlet of the stomach, or hyperchlorhydria, also a symptom associated with perverted function of the stomach. The late Knud Faber in his book "Nosography" has very classically presented a review of the conceptions of the various schools developed over the last century, and shows the importance of clinical medical research as one of the important means of developing a more complete and rational understanding of diagnosis. Our present day views are so colored by the older views of the teachers, such as Kussmaul, Riegel, Leube and others, that such a review is perhaps justified.

About 100 years ago the famous French pathological anatomist and clinician made the important observation and contribution placing gastric ulcer as a clinical entity. From the clinical point of view no intensive or progressive thought was given to the subject until Kussmaul in 1867 revived the use of the stomach pump. This seems to have had a peculiar and stimulating influence upon investigations in disorders of the stomach. Szabo first recognized the presence of acid; Velder noted the absence of acid in carcinoma of the stomach and in the presence of very high temperature; Luebe studied the affect of food on gastric secretion; and Ewald and Jergensen contributed the idea of a test meal and developed a soft pliable stomach pump. This as Faber has noted marked an epoch in medical diagnosis generally and in gastro-intestinal diagnosis in particular. A tangible method of approach was developed which, with certain changes, has been found to be of great value at the present time. Certain erroneous conceptions however, based on this early interpretation, have been handed down to us. The underlying pathology was often overlooked and attention given almost entirely to symptoms. Today our text-books are still filled with the old terminology where these symptoms are dignified as disease entities. Unfortunately for us and in fairness to the older teachers we have added more confusion to the list by including such terms as auto-intoxication, viceroptosis, mucous colitis and the like. Granted that such conditions exist, nevertheless it must be appreciated that these are complications of a perverted physiological function or a manifestation of a constitutional abnormality. Nervous indigestion, if we may allow the term, is an expression usually of some nervous instability where the symptoms of the gastro-intestinal tract are paramount in the mind of the patient.

Improvements in the diagnostic procedure of the past 25 years may be credited largely to the dual role of surgery and roentgenology. Organic pathology has been visualized and attempt made to correlate it with the general symptomatology. Perhaps to Soupault and Hartman in France must go the credit for proving the relationship between excessive gastric secretion and obstructions from peptic ulcer. An internist and surgeon working together, correlating their views and observations, made possible this contribution. Moynihan, Mayo and Sippy in the early

part of this century helped to crystalize the clinical picture of peptic ulcer. We can, with little difficulty, arrive at a working diagnosis by weighing carefully symptoms as presented by the patient and this has been made possible through the careful observations of this great group of teachers and clinicians.

Were it true that all lesions and disorders of the gastro-intestinal tract could be clearly ascertained by one method of examination alone, it would only be necessary to refer to that procedure for evidence. Fortunately this group of organs may be quite accurately studied by such methods as will permit of fairly dogmatic interpretation. This investigation must proceed along an orderly and routine fashion.

Let us suppose that one is to investigate a patient with a chronic gastro-intestinal disorder complaining of epigastric distress and vomiting. What organ is involved? Is it the stomach, colon, gall bladder or referred from the heart or lungs? This can be properly decided only after a careful history has been taken and such tests made as are indicated. It is obvious that a definite knowledge must be had of the characteristic symptoms and signs of the lesions occurring in these organs. History taking is an art. It requires an imagination and definite amount of purposeful effort. One must inquire as to the nature of the distress and when it occurs. Does it appear 1 to 2 hours after eating and occasionally at night time? Is it relieved by food, alkali and vomiting? Attempt should be made to elicit what has been called a "typical day" history, that is find a regularly recurring distress conforming to the same general characteristics day after day. This requires careful questioning.

Assuming the presence of a peptic ulcer one may determine the presence or absence of obstruction at the outlet of the stomach, hemorrhage, continued secretion, perforation, and even suspect the possibility of a secondary carcinoma engrafted upon the ulcer lesion. This knowledge will aid in prognosis and to a large extent determine the method of treatment. The obstruction of the stomach would be indicated by vomiting of food and presence of night distress; continued secretion by vomiting large quantities of liquid out of proportion to the amount taken into the stomach; perforation by severe sharp lancinating pain and usually a history of shock; and secondary carcinoma by variations in the clinical picture incompatible with an uncomplicated ulcer. In the patient with primary carcinoma of the stomach evidence of loss of weight and appetite, distress gradually increasing in severity and not definitely related to eating, and evidences of cachexia will be suggestive of the lesion. Both epigastric distress and vomiting are present definitely as a part of the symptom complex, migraine. The entire examination may be negative except for the history of recurring attacks of headaches. Usually the mother or father have been victims of the same trouble. Frequently the patient has been little concerned by the headache but much distressed over the vomiting and other evidences of what he or she call indigestion.

Gall bladder disease may be easily confused although a careful history plus a complete examination will make the differentiation clear. The tabetic patient may vomit blood and investigation reveals the added pathology of peptic ulcer.

In disorders of the intestine one will study, first the diet, noting evidence of food idiosyncracies, starch intolerance, influence of raw fruits and vegetables and possible vitamin deficiencies; second, characteristics of the stools, whether hard and dry, soft, mushy, liquid, tarry, and also presence of blood and fermentative or putrefactive odor; third, subjective symptoms of pain, cramp, colic, borborygmus, flatus, and distress related to bowel movement; fourth, relation to nervous instability and to associated diseases as thyro-toxicosis, tuberculosis and syphilis, pernicious anemia and cardiac trouble.

There are more real sufferers on the street today with intestinal disturbances than almost any other. The mortality is low but the morbidity is high. Constipation which is usually more apparent than real can only be diagnosed by careful history. This patient often follows an unsatisfactory diet and takes an excessive amount of cathartics and enemas. His intestinal tract is over active as indicated by the loose movements and abdominal disturbance. The patient's conception of his trouble is based on the necessity of cathartic for a stool but if his habits are analyzed carefully it will readily be noted that this whole procedure is in error and with

slight change in diet and routine a normal action will follow. When true constipation is present a hard and dry stool will be the most obvious evidence. The results following the self treatment because of erroneous conception of this kind has given rise to the numerous terms as atonic constipation, spastic constipation, spastic colitis or mucous colitis. This is the chronic intestinal invalid as some one has so well said, the patient who has received advice from neighbor, friend, doctor and quack regarding tricky diets, cathartics, various lubricating oils, colon irrigations and other types of curious treatment devised by the imaginative therapist. The irritation may be only slight as from too much raw fruit, bran or buttermilk, but only a history could have determined the cause of and proper treatment for the irritability. Or perhaps alternating constipation and diarrhea is present, the loose stools being frothy and unformed at times. Usually a varying degree of starch intolerance is present. Inquiry into the nature of the diet and the character of stool will reveal more about the patient with chronic intestinal upset than any other method.

Physical Diagnosis is of less value here than in diseases of other organs but general inspection may reveal the clue to pathology in the gall bladder, the palor and wasting in carcinoma, the presence of visible peristalsis and gross tumor masses. The palpating hand will note rigidity, tumors in the abdomen, evidences of tenderness and spastic contraction of the colon. The rectum is routinely examined for fissures, hemorrhoids, strictures and tumors. A proctosigmoidoscopic examination is always done where there is complaint of symptoms of the rectum. A careful examination of the heart and lungs, reflexes, etc., are imperative.

Laboratory Work besides covering a routine examination is primarily concerned with the secretory and motor function of the stomach and intestine and the presence of blood in the gastric content and the stool. A test breakfast given on an empty stomach will reveal the presence or absence of ferments in the gastric juice. Perhaps little can be determined from the acid curve; certainly duodenal ulcer must not be diagnosed on the presence of hyperacidity alone. A quantity aspirated of more than 200 c.c. is quite suggestive of stagnation or of continued secretion. A low acid value and the presence of blood suggest carcinoma while a high acid and blood suggest ulcer, although by no means pathognomonic. Microscopic examination may reveal blood, pus, yeast sarcinae or long bacilli. When obstruction of the stomach is suspected then a large full meat-free meal is given and aspirated at the end of seven hours. When no food is removed it may be definitely said that there is no obstruction of importance and this will often be of value in determining the necessity for operation. In examining the bowel movement one will not be satisfied to note the presence of blood, but determine if blood is in the center of the stool, indicating its origin as high up in the intestinal tract, is it free and bright, suggesting a lesion in the rectum or is it associated with pus and mucus, indicating an ulcerative process in or above the rectum. The consistency is noted, the odor, whether putrefactive or fermentative, size, caliber, whether normal or ribbon-like, the latter suggesting spasm or constriction in the sigmoid or rectum. Since the bowel movement is such a serviceable criterion for the condition of the colon, it should always be carefully and routinely examined. Microscopic and bacterologic examinations will be made routinely in all unformed specimens.

The x-ray examination should always be done where there is an indication of organic disturbances as evidenced by the history or by the presence of blood and pus in the gastric content or the stool. It, however, is often valueless and even harmful in diagnosis when the clinician is content to depend entirely upon the x-ray laboratory for a diagnosis. The roentgenologist, unless one highly skilled, can only state that there is or is not an organic lesion present. If no organic disease is demonstrated the clinician will then dismiss the gastro-intestinal tract but his patient continues on with the functional disorder still a definite disturbance. The harm coming from the x-ray perhaps need not be discussed except to refer to the pernicious influence and effect of poor reports by poor technicians. It has been my good fortune to be closely associated with excellent roentgenologists both in practice and teaching, the evidence of excellence being indicated by their desire to correlate all clinical, laboratory and x-ray findings before

drawing a final conclusion. They are true consultants.

Observation and Therapeutic Test-Out. When the clinical picture is confusing and the usual diagnostic procedures are not conclusive, the patient should be placed under careful observation for some time including definite control of meals, making frequent gastric and stool analyses and recording all distress. During this time if the patient has his usual distress, we must determine if relief is obtained by alkali, food or aspiration or is it materially affected by a large water enema. If the latter influences the pain and distress, a disorder of the colon may be suspected, if the former affords relief, then an ulcer is likely to be present. Gastroenterologists made use of these observations before the x-ray was in common use and we have found them to be of greatest value even today and continue them as routine practice. A diagnosis of ulcer is justified if these tests are positive in spite of negative x-ray and if the distress and symptoms are cleared after dietary measures are instituted we have very convincing evidence. Occult blood may regularly be present in the bowel movement and when all sources are excluded, we may have the only evidence of an early carcinoma. It has been pointed out numerous times that if the epigastric distress disappears after frequent feedings, a peptic ulcer is probably present. More accurate information may be obtained by giving not only frequent feedings but alkalies to completely neutralize the gastric juice and if the distress does not disappear or occult blood continues in the stool we are then dealing with a complication of an ulcer or an entirely different pathology. This information obtained from close observation will be of greatest help in correlating the other laboratory and x-ray findings; there must be no unexplainable incompatibilities. It must be obvious therefore that in diagnosis of diseases of the gastro-intestinal tract, careful attention must be given to all of the data obtained from the various procedures with special stress placed upon the information gained from an intelligently and carefully obtained history. The laboratory and x-ray methods are indispensible yet too often over valued. More accurately diagnosed and satisfactorily treated cases result if there was a fuller appreciation of the disturbances resulting from functional as well as organic trouble.

Madame: Nora, have you seen my opera pumps?

Maid: No, mum, I ain't. Of course, it ain't none of my business, but how much do you get for pumping at the opera?

Society Proceedings

PIKE COUNTY

The July meeting of the Pike County Medical Society was held the 23rd at Pleasant Hill.

A bountiful repast of fried chicken and all the accompanying good things to be desired was served to us at the hotel.

The meeting was held in the parlors of the Baptist church with our new President, Dr. T. D. Kaylor of Barry, in the chair.

The meeting opened in the usual formal manner and all business was quickly disposed of.

The first paper on the program was given by Dr. R. O. Stites of Industry, Ill., on "Undulant Fever."

Dr. Stites is a man of rare ability. Practicing in a little town of 600 people and doing the original research work and study of undulant fever that he has, until he has definitely diagnosed 28 cases of that disease, seems remarkable.

There is probably no man in this country today better versed in undulant fever than is Dr. Stites. Too much cannot be said of the work of Dr. Stites, of his paper, nor of his coming the distance he did to give it to us, and bringing a very interesting case with him to present to the meeting.

His paper was fully descriptive of the disease in all its many phases and told also of the many ailments that have been unsuccessfully treated, treated under mistaken diagnoses when undulant fever finally proved to be the real cause of illness. Dr. Stites' success in this line is due to his indefatigable work and study of the disease, and the ferreting out of the large number of cases he has found, many of which were "old chronics," many of long standing.

His paper was received with acclaim by everyone present, as one of the best things that has ever been presented before the Society.

Dr. C. P. McRaven of Pittsfield led in the discussion of this paper, and in a very interesting way gave much from his personal encounter with the disease, its treatment, etc.

Others who discussed the paper were Drs. Andrae and Cunningham of Louisiana, Mo., Dr. Nelson of the State Department of Health, Springfield; Dr. Kuntz of Barry and Dr. Goodman of Pleasant Hill. In closing Dr. Stites answered many questions, and further elaborated on points of his paper.

Dr. Stites illustrated his paper with a number of charts.

The second paper on the program was a very graphic,

thoroughly scientific and complete one on carcinoma of the breast, given by Dr. Cunningham of Louisiana, Mo., in which he started with the embryological formation and structure of the breast, the different elements of structure of the mature breast, the directions and the tendencies to mestastasis and giving the clinical symptoms, the points of differentiation between operable and inoperable cases, and seeing but little use in following the operation with x-rays.

This paper was indeed interesting and showed to us Dr. Cunningham as a young man of fine ability in his chosen field.

This paper was little discussed, as everyone felt the paper was complete and conclusive.

Dr. Hetherlin of Louisiana, Mo., gave the third paper on the program, on the importance of medicine and discovery, progress and achievement in human history. This scholarly paper provoked no discussion, called for none, was complete in itself and together with the preceding paper made us proud of our Louisiana friends and twice glad they could be with us as our guests and take part on the program.

A vote of thanks was tendered to all who took part in the program and to our hosts, Drs. J. E. Goodman and R. P. Wells of Pleasant Hill. An invitation to meet in Barry in October was accepted, and the meeting adjourned in due form.

F. N. Wells, Secretary.

Marriages

LEO GAMBURG, East Moline, Ill., to Miss Hinda Notarius of Chicago, August 2.

WALTER E. EISENBERG to Miss Ruth Bailis, both of Chicago, June 14.

WALTER COLFAX LOVEJOY, Maywood, Ill., to Miss Alma Salena Sheets of Greenfield, Ind., May 30.

News Notes

—Toxoid may now be had from the state department of public health instead of toxin-antitoxin for immunizing children against diphtheria The department will continue to provide toxin-antitoxin to those who prefer this product.

—A series of scientific units dealing with specific diseases, constructed through the cooperation of the University of Illinois College of Medicine with the state department of health were a feature of the health exhibit at the Illinois State Fair, August 22-29, at Springfield. The subjects covered include tuberculosis, cancer, heart disease, diphtheria, pneumonia, typhoid fever and animal experimentation. Booths were devoted to home and community sanitation, to milk, water, waste disposal, nutrition, ventilation, social hygiene and similar subjects. The state department of health also provided facilities for the physical examinations of babies and for the superficial medical examination of adults.

—Owing to general conditions, it has been deemed advisable to postpone the Chicago Graduate Course in Ophthalmology for one year. The present plans call for the beginning of the Course in September, 1932. Applications will be received by the Secretary, Dr. R. C. Gamble, 30 N. Michigan Ave., Chicago, Illinois, up to July 15, 1932.

—A state committee has been appointed by the state department of public health to combat the increasing prevalence of undulant fever. At its first meeting in Springfield, July 21, the committee authorized the appointment of subcommittees of three members each to represent the medical profession, cattle and swine breeders, milk distributors, dairymen, poultry and goat raisers, veterinarians and meat packers. The general committee will develop a practical program for the control of undulant fever in man and beast. The subcommittees will collect all available information relating to undulant fever from the point of view of the industry or profession represented and to suggest activities that would be practicable from the same standpoint; they will also constitute a medium for extending educational activities to the groups represented. The first case of undulant fever in man reported in the state was in 1928. In 1929 and 1930 there were, respectively, eighteen and sixty-three cases reported, while the first half of 1931 yielded seventy-seven cases. Deaths of six persons were attributed to undulant fever in Illinois during 930. The members of the committee include Dr. Andy Hall, state health director, chairman; Robert Graham, D. V. M., professor of animal pathology and hygiene, University of Illinois, Urbana, vice-chairman; Dr. John J. McShane, state epidemiologist, secretary; Dr. Lloyd L. Arnold, professor of bacteriology and preventive medicine, University of Illinois College of Medicine; Dr. Hubert Houston, assistant state epidemiologist; Howard J. Shaughnessy, Ph.D., chief state bacteriologist; Dr. Randolph O. Stites, practicing physician, Industry, and William H. Welch, D. V. S., state veterinarian.

—Forty-eight dog heads were examined by the state diagnostic laboratory during the first twenty-eight days of July; thirteen of these heads were positive for rabies. In July, 1930, twenty-nine heads were examined, with four positive. According to the state health department, these statistics indicate that rabies is more prevalent this year. During July, the state department of health provided free Pasteur antirabic treatment to 37 people who had been bitten by dogs reputed to be rabid.

—A cancer clinic has been in operation for the last three months at Cook County Hospital. Through its work an effort will be made to correlate all the therapeutic measures of any importance in the treatment of cancer in an attempt to select the one best adapted to individual cases. A follow up of each patient is made. Space has been made available on the fifth floor of the hospital for this work, which will be carried on under the general supervision of the hospital and the Cook County Training School.

—A White House Conference on Child Health and Protection will be held at the Palmer House, October 30-31, with a view to giving widespread effect in the Chicago area to the "children's charter" adopted last year at the conference in Washington. It is planned to have five divisions; medical service, public health service, education and training, child welfare and community planning for child health and welfare.

Deaths

HENRY M. BASCOM, Peoria, Ill.; Hahnemann Medical College and Hospital, Chicago, 1873; a Fellow A. M. A.; chief surgeon Illinois Light and Power corporation and Illinois Terminal railroad system; formerly a practitioner in Ottawa for 36 years; aged 78; died July 4, in the St. Francis Hospital, of myocarditis.

OSKAR BRUN, Chicago; University of Basel Medical Faculty, Basel, Switzerland, 1879; aged 80; died, June 11, of myocarditis.

WILLIAM ALLEN DELONG, Belleview, Ill.; Medical Department of Washington University, St. Louis, 1907; aged 51; died, July 14, of carcinoma.

FREDERICK J. DUDLEY, Decatur, Ill.; Chicago Homeopathic Medical College, 1894; a Fellow A. M. A.; on the staff of Decatur and Macon County Hospital; aged 73; died, August 3, of cerebral hemorrhage.

CLAUDE CLIFFORD HARRISON, Chicago; Hahnemann Medical College and Hospital, Chicago, 1921; a Fellow A. M. A.; aged 39; died, July 21, of streptococcic septicemia.

THOMAS GREEN ISHERWOOD, West Chicago, Ill.; Rush Medical College, 1883; a Fellow A. M. A.; local surgeon for Chicago and Northwestern, Elgin, Joliet and Eastern and Chicago, Aurora and Elgin railway companies; member of American Association of Railway Surgeons; aged 74; died, July 19, from a ruptured aneurysm.

JOHN W. KELLY, Springfield, Ill.; Northwestern University Medical School, 1897; member of Sangamon County medical society; Fellow of American College of Surgeons; member of Illinois Gorgas Memorial Institute of Tropical and Preventive Medicine; aged 68; died, August 2, of complications following an operation for disease of a sinus.

FREDERICK R. KLEENE, Chicago; Rush Medical College, Chicago, 1887; member of Illinois State Medical Society; aged 68; died suddenly, July 25, of cardiac thrombosis.

CHARLES HOPKINS LONG, Chicago; McGill University Faculty of Medicine, Montreal, 1888; member of Illinois State Medical Society; aged 67; died, August 19, at Escanaba, Mich., of injuries received in an auto accident near Rexton, Mich.

WILLIAM STEELE MCCLANAHAN, Galesburg, Ill.; Rush Medical College, 1883; aged 74; died, August 1, of angina pectoris.

JOHN HANCOCK MCCLELLAN, Evanston, Ill.; Rush Medical College, 1911; a Fellow, A. M. A.; aged 55.

JOSEPH JAY MCGRORY, Chicago; Bennett Medical College, 1896; University of Illinois College of Medicine, 1908; member of Illinois State Medical Society; assistant clinical professor of surgery, Loyola University School of Medicine; aged 59; died, August 8, of diabetes, myocarditis and chronic nephritis.

WILLIAM ANTHONY POTTS, Lansing, Ill.; Milwaukee Medical College, 1908; member of Chicago Medical Society; aged 52; died, July 27.

GEORGE W. REZANKA, Oak Park, Ill.; Rush Medical College, 1893; member of Illinois State Medical Society; aged 62; died, August 21.

GEORGE T. ROWLAND, Martinsville, Ill.; Louisville, (Ky.) Medical College, 1876; aged 78; died, June 19, of heart disease.

ANNIE HUNGERFORD WHITE, Chicago; Hahnemann Medical College and Hospital, 1896; a practitioner for many years and one of the oldest members of the Chicago Woman's club; aged 84; died, August 20, of coronary thrombosis and arteriosclerosis.

DANIEL H. WILLIAMS, Chicago; Northwestern University Medical School, 1883; surgeon to South Side dispensary, 1884-1892; one of the founders of Provident Hospital and surgeon in chief, 1891-1893; later with Freedman's Hospital in Washington, D. C.; formerly associate surgeon at St. Luke's Hospital; aged 73; died, August 4, at Idlewild, Mich., of myocarditis.

SILVEY J. WILSON, Versailles, Ill.; College of Physicians and Surgeons, Keokuk, Iowa, 1888; a former member of Illinois State Medical Society; died, July 21.

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